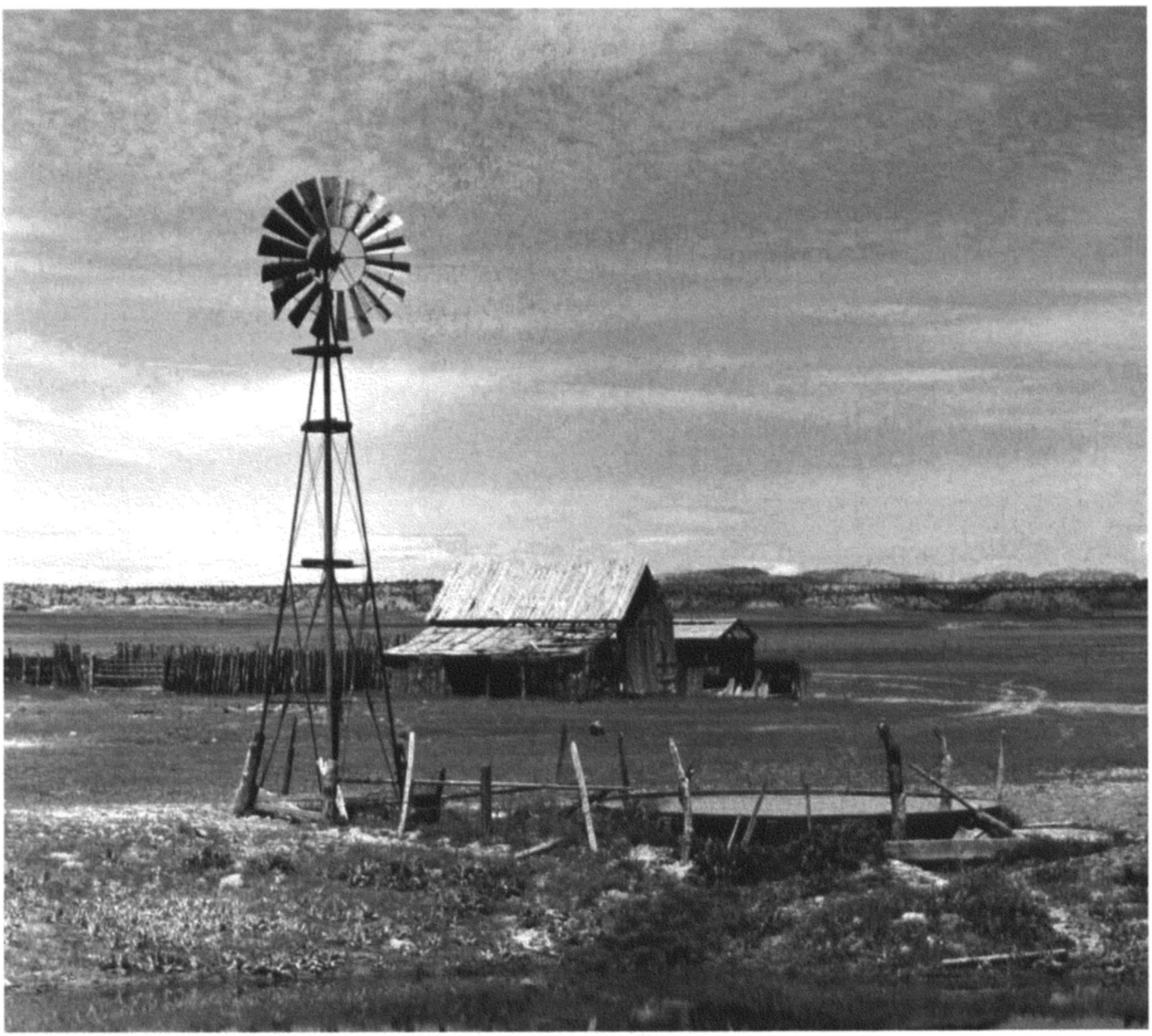
USDA United States Department of Agriculture

Natural Resources Conservation Service

United States Department of the Interior, Bureau of Land Management, Bureau of Indian Affairs, and National Park Service; in cooperation with the Arizona Agricultural Experiment Station and the Kaibab-Paiute Tribe

Soil Survey of Mohave County Area, Arizona, Northeastern Part, and Part of Coconino County



How To Use This Soil Survey

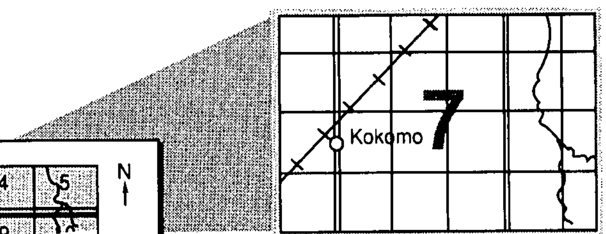
General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

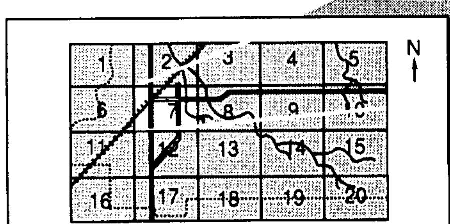
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.



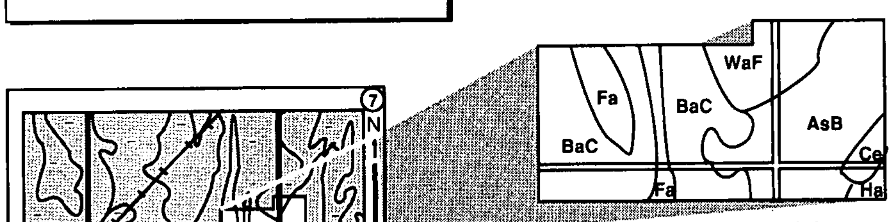
MAP SHEET



INDEX TO MAP SHEETS

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

MAP SHEET

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1982. Soil names and descriptions were approved in 1992. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made cooperatively by the Natural Resources Conservation Service and the Arizona Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Fredonia Natural Resource Conservation District.

Cover: Water catchments and deep wells furnish water for livestock.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is http://www.nrcs.usda.gov.

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Issued 2004

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Michael Somerville
State Conservationist
Natural Resources Conservation Service

Soil Survey of Mohave County Area, Arizona, Northeastern Part, and Part of Coconino County

By Wendell Jorgensen, Natural Resources Conservation Service

Fieldwork by Wendell Jorgensen and Mark Clark

United States Department of Agriculture, Natural Resources Conservation Service, and
United States Department of the Interior, Bureau of Land Management,
Bureau of Indian Affairs, and National Park Service;
in cooperation with the Arizona Agricultural Experiment Station
and the Kaibab-Paiute Tribe

Introduction

The soil survey area consists of the northern part of Mohave County east of the Hurricane Cliffs (fig. 1). It does not include that portion of Grand Canyon National Park that lies within Mohave County north of the Colorado River. The survey area has a land area of 1,038,145 acres.

The soil survey area is complex, both in the variety of the terrain and the soils. Deep alluvial soils characterize the Antelope Valley. Headward erosion of intermittent streams has resulted in deep incisions that are common in the area. The plateau region of the Vermillion Cliffs area display sandy eolian and alluvial sediments. The Grand Canyon National Park boundary region is composed of shallow alluvial deposits associated with limestone outcrops. The Uinkaret Mountains on the southwest edge of the survey area consist of alluvium from volcanic parent materials.

Cattle ranching and uranium mining are the most important industries. Irrigation farming is practiced in the Colorado City area.

Descriptions, names, and delineations of soils in this survey do not fully agree with those on maps for adjacent soil survey areas. Differences are the result of better knowledge of soils, modification in series concepts, intensity of mapping or the extent of soils within the survey.

The Colorado City area is mapped in slightly greater detail because of its present and potential agricultural significance.

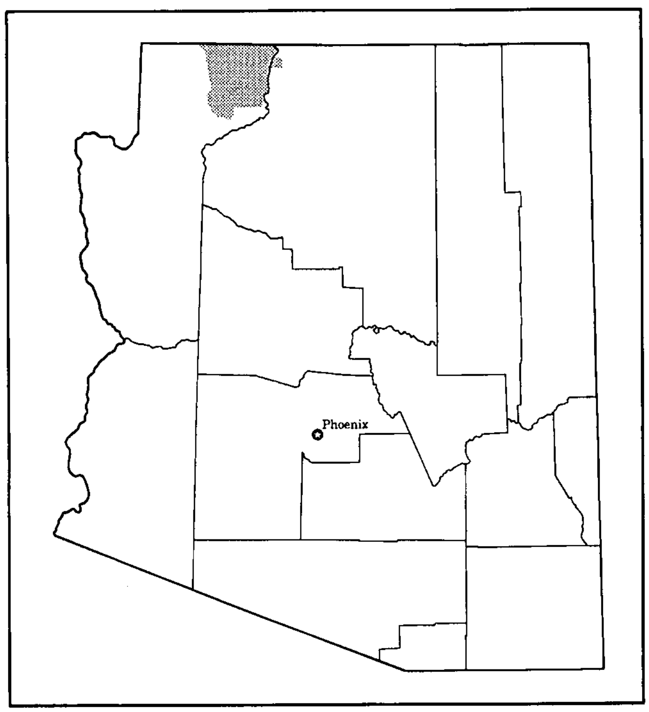

Figure 1.—Location of Mohave County Area, Arizona, Northeastern Part, and Part of Coconino County

General Nature of the Survey Area

This section briefly discusses the settlement and development, transportation, and climate of the survey area.

Settlement and Development

The earliest inhabitants of the Arizona Strip were the Virgin Branch of the Anasazi Culture. These natives were farmers that settled on the rims and tributary canyons along the Grand Canyon. The Anasazi incursion from the east continued to be sporadic from 700 A.D. to 1100 A.D. About 1150 A.D., Numic-speaking people spread south and east along the southern part of the Colorado Plateau and formed the two major tribunes of Southern Paiutes in the area. The first Kaibab Paiutes spread out along the northern border of the survey area along the Vermillion Cliffs. The other tribe, the Uinkaret Paiutes, settled along the Uinkaret Mountains in the vicinity of Mount Trumbull. Both tribes were mainly foragers, but small groups learned farming techniques from the Anasazi people.

The area was explored by the Dominguez-Escalante Expedition in 1776, which passed through the Arizona Strip in search of a suitable crossing of the Grand Canyon of the Colorado River.

Northern Mohave county was first settled by Mormon pioneers sent from Salt Lake City by Brigham Young in the 1860s. The early settlers overcame attacks by Paiute and other local Indian tribes and became firmly established on the lands. This was open range country, and range wars followed as cattle barons fought for control of the range. The first influx of cattle occurred around the turn of the century when a large herd of longhorns was driven across the Colorado River at Pierce's Ferry.

The most significant event leading to more intensive settlement of the strip came in 1872 when John D. Lee established a ferry near the mouth of the Paria River. The Paria is a tributary of the Colorado river about 15 miles below the present Glen Canyon Dam in northern Coconino County. This site, which still bears the name Lee's Ferry, provided important access for Mormon migrants and helped open the Arizona Strip to settlement.

Homesteaders arrived on the Arizona Strip during the 1920s in important numbers. They set to work plowing the soil in the Pipe Spring Valley.

Commercial mining activity in northern Mohave was begun in 1980 by Energy Fuels Nuclear Corporation, which located their first uranium mine in Hack's Canyon, a tributary canyon of Kanab Creek.

Mohave County Seat is in southern Mohave County at Kingman, Arizona, and is separated from the northern part by the Grand Canyon of the Colorado River.

Northern Mohave county is sparsely populated, having less than 2,500 inhabitants. Colorado City, Moccasin, Six Mile Village, and Kaibab are the only communities, and all are located along the north edge of the survey area.

Transportation

One state highway serves the soil survey area. Arizona Highway 389 runs from east to west along the northern edge of the survey area.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Pipe Springs National Monument in the period 1964 to 1991. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 36.2 degrees F, and the average daily minimum temperature is 22.4 degrees. The lowest temperature on record is -13 degrees. In summer, the average temperature is 73.6 degrees, and the average daily maximum temperature is 91.8 degrees. The highest recorded temperature is 110 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 10.38 inches. Of this, 4.7 inches, or 45 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 1.6 inches.

The average seasonal snowfall is about 10.6 inches. The greatest snow depth at any one time during the period of record was 10.4 inches.

The average relative humidity in midafternoon is about 30 percent. Humidity is higher at night, and the average at dawn is about 45 percent.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of

crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled primarily from farm records.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will be flooded in most years, but they cannot predict that a soil will always flood on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape (fig. 2). Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

Dominantly very shallow to very deep, well drained and somewhat excessively drained, nearly level to very steep soils in the arid climatic zone

1. Pennell-Bacobi

Shallow and moderately deep, well drained, nearly level to hilly, loamy soils; on hills, mesas and fan terraces

Setting

Topography: Hills, fan terraces and mesas
Location: East central portion of the survey area in Antelope Valley
Slope range: 1 to 20 percent
Vegetation: Fourwing saltbush and Indian ricegrass
Elevation: 4,700 to 5,100 feet
Mean annual precipitation: 7 to 11 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Percent of survey area: 7
Pennell soils: 60 percent
Bacobi soils: 20 percent
Minor soils: 20 percent

Soil Properties and Qualities

Pennell Soil

Depth: Shallow
Drainage class: Well drained
Parent material: Alluvium from limestone and sandstone
Textural class: Loamy
Distinctive properties: Shallow soil over limestone

Bacobi Soil

Depth: Moderately deep
Drainage class: Well drained
Parent material: Alluvium from limestone
Textural class: Loamy
Distinctive properties: Moderately deep soil over limestone

Minor Soils

- Jocity soils on flood plains
- Grieta and Kinan soils on fan terraces
- Sheppard soils
- Monue soils
- Torriorthents
- Rock outcrop

Use and Management

Major management factors: Depth to bedrock, slope, limited available water capacity, hazard of water erosion, hazard of wind erosion
Major use: Rangeland and wildlife habitat

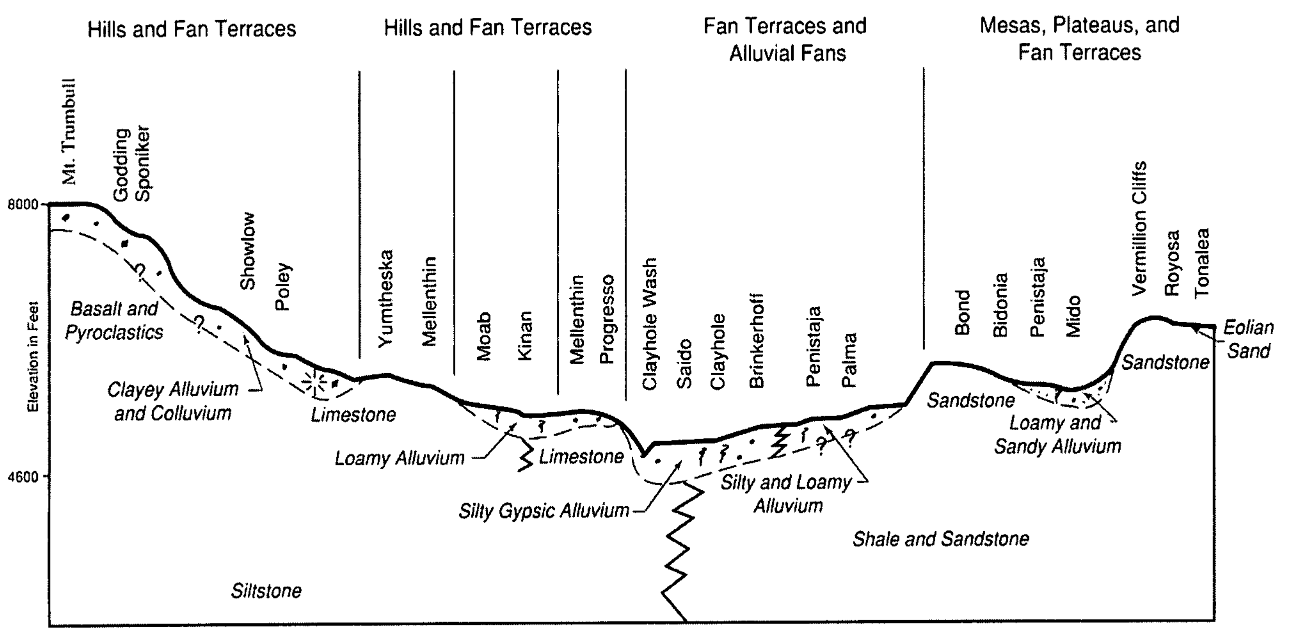

Figure 2.—Idealized soil landscape profile of Mohave Area, Arizona, Northeastern Part, and Part of Coconino County.

2. Grieta-Kinan-Hatknoll

Very deep, well drained, nearly level to rolling, loamy and clayey soils; on fan terraces

Setting

Topography: Fan terraces
Location: West central portion of the survey area in the Black Canyon vicinity
Slope range: 1 to 15 percent
Vegetation: Fourwing saltbush and Indian ricegrass
Elevation: 4,600 to 5,100 feet
Mean annual precipitation: 7 to 11 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Percent of survey area: 5
Grieta soils: 60 percent
Kinan soils: 25 percent
Hatknoll soils: 10 percent
Minor soils: 5 percent

Soil Properties and Qualities

Grieta Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium from sandstone
Textural class: Loamy
Distinctive properties: Very limy layer at moderate depths

Kinan Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium from limestone
Textural class: Loamy
Distinctive properties: Very limy layer at shallow depths

Hatknoll Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium from basalt and pyroclastics

Textural class: Clayey
Distinctive properties: Very limy layer at moderate depths

Minor Soils

- Pennell soils
- Jocity soils on flood plains
- Brinkerhoff soils
- Monue soils

Use and Management

Major management factors: Hazard of wind erosion, hazard of water erosion
Major use: Rangeland and wildlife habitat

3. Clayhole-Gypsiorthids-Jocity

Very deep, well drained, nearly level to steep, loamy soils; on fan terraces, alluvial fans, flood plains and stream terraces

Setting

Topography: Fan terraces, alluvial fans, flood plains and stream terraces
Location: Makes a half circle from the upper northwest portion of the survey area nearly to the upper northeast portion
Slope range: 1 to 50 percent
Vegetation: Shadscale, fourwing saltbush and Indian ricegrass
Elevation: 4,400 to 5,000 feet
Mean annual precipitation: 7 to 11 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Percent of survey area: 28
Clayhole soils: 20 percent
Gypsiorthids: 15 percent
Jocity soils: 15 percent
Minor soils: 50 percent

Soil Properties and Qualities

Clayhole Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium from gypsiferous shale
Textural class: Loamy
Distinctive properties: Gypsum throughout the profile

Gypsiorthids

Depth: Very shallow to very deep
Drainage class: Well drained
Parent material: Alluvium from gypsiferous shale
Textural class: Variable
Distinctive properties: A layer of gypsum accumulation

Jocity Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Mixed alluvium
Textural class: Loamy
Distinctive properties: Stratified profile

Minor Soils

- Pennell soils
- Brinkerhoff soils
- Monue soils
- Sheppard soils

Use and Management

Major management factors: Gypsum in the profile, hazard of water erosion, limited available water capacity
Major use: Rangeland and wildlife habitat

4. Rock Outcrop-Torriorthents

Rock outcrop and very shallow to very deep, well drained and somewhat excessively drained, steep to very steep, variable textured soils; on hills and escarpments

Setting

Topography: Hills and escarpments
Location: Kanab Creek and Hack Canyon
Slope range: 30 to 70 percent
Vegetation: Fourwing saltbush, galleta and Indian ricegrass
Elevation: 3,500 to 6,600 feet
Mean annual precipitation: 7 to 11 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Percent of survey area: 2.5
Rock outcrop: 40 percent
Torriorthents soils: 40 percent
Minor soils: 20 percent

Soil Properties and Qualities

Rock Outcrop

Parent material: Sandstone, limestone and other similar materials
Distinctive properties: Bare rock

Torriorthents Soil

Depth: Very shallow to very deep
Drainage class: Well drained and somewhat excessively drained
Parent material: Alluvium and colluvium from sandstone, limestone and shale
Textural class: Variable
Distinctive properties: Steep cliffs

Minor Soils

- Sheppard soils

Use and Management

Major management factors: Limited available water capacity, hazard of water erosion, depth to bedrock
Major use: Rangeland and wildlife habitat

Dominantly very shallow to very deep, well drained and somewhat excessively drained, nearly level to steep soils in the arid climatic zone

This group consists of four map units. It makes up about 42.5 percent of the survey area.

This group is used mainly as rangeland and wildlife habitat. It is also used as irrigated cropland and urban land.

5. Mellenthin-Moab-Poley

Shallow and very deep, well drained, nearly level to very steep, very gravelly loamy and clayey soils; on hills, fan terraces and mesas

Setting

Topography: Fan terraces, mesas and hills
Location: The south-central portion of the survey area on the Unikaret and Kanab Plateaus
Slope range: 1 to 50 percent
Vegetation: Sagebrush and blue grama
Elevation: 4,400 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Percent of survey area: 29
Mellenthin soils: 40 percent
Moab soils: 10 percent
Poley soils: 10 percent
Minor soils: 40 percent

Soil Properties and Qualities

Mellenthin Soil

Depth: Shallow
Drainage class: Well drained
Parent material: Alluvium from limestone
Textural class: Loamy and very gravelly
Distinctive properties: Shallow over limestone

Moab Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium from limestone
Textural class: Loamy and very gravelly
Distinctive properties: High lime content below 6 inches

Poley Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium from basalt and pyroclastics
Textural class: Clayey
Distinctive properties: Very limy layer at shallow depths

Minor Soils

- Curhollow
- Milok, Barx, and Progresso soils
- Wukoki and Lomaki soils
- Torriorthents and rock outcrop along Kanab Creek drainage and tributaries
- Lava flows

Use and Management

Major management factors: Depth to bedrock, slope, hazard of water erosion, limited available water capacity
Major use: Rangeland and wildlife habitat

6. Barx-Mido-Begay Series

Very deep, well drained to excessively drained, nearly level to rolling loamy and sandy soils; on fan terraces

Setting

Topography: Fan terraces
Location: In the Colorado City-Canebeds portion of the survey area and the Kaibab Indian Reservation
Slope range: 1 to 12 percent
Vegetation: Big sagebrush, sand sagebrush and Indian ricegrass
Elevation: 4,900 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Percent of survey area: 9
Barx soils: 50 percent
Mido soils: 15 percent
Begay soils: 10 percent
Minor soils: 25 percent

Soil Properties and Qualities

Barx Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium from sandstone
Textural class: Loamy
Distinctive properties: Very limy layer at shallow to moderate depths

Mido Soil

Depth: Very deep
Drainage class: Excessively drained
Parent material: Alluvium and eolian from sandstone
Textural class: Sandy
Distinctive properties: Uniformly sandy profile

Begay Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium from sandstone
Textural class: Loamy
Distinctive properties: Sandy layer at moderate depths

Minor Soils

- Bond and Bidonia soils on mesas
- Manikan soils on stream terraces
- Campanile soils on hills
- Palma soils on fan terraces
- Torriorthents
- Mellenthin soils

Use and Management

Major management factors: Hazard of water erosion, hazard of wind erosion, limited available water capacity
Major use: Rangeland and wildlife habitat

7. Bond-Bidonia

Shallow, well drained, nearly level to rolling, loamy and clayey soils; on plateaus and mesas

Setting

Topography: Plateaus and mesas
Location: The plateau west of Colorado City and Yellowstone Mesa
Slope range: 1 to 25 percent
Vegetation: Utah juniper, pinyon, and big sagebrush
Elevation: 5,000 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Percent of survey area: 3
Bond soils: 40 percent
Bidonia soils: 30 percent
Minor soils: 30 percent

Soil Properties and Qualities

Bond Soil

Depth: Shallow
Drainage class: Well drained
Parent material: Alluvium from sandstone
Textural class: Loamy
Distinctive properties: Shallow soil over sandstone

Bidonia Soil

Depth: Shallow
Drainage class: Well drained
Parent material: Alluvium from sandstone
Textural class: Clayey
Distinctive properties: Shallow soil over sandstone

Minor Soils

- Manikan soils on stream terraces

- Barx soils on fan terraces
- Torriorthents
- Rock outcrop

Use and Management

Major management factors: Depth to bedrock, limited available water capacity, hazard of wind erosion
Major use: Rangeland and wildlife habitat

8. Mellenthin-Curhollow

Shallow and shallow to a hardpan, well drained, nearly level to steep, very gravelly loamy soils; on fan terraces and hills

Setting

Topography: Fan terraces and hills
Location: Northeastern portion of the survey area
Slope range: 1 to 50 percent
Vegetation: Big sagebrush, fourwing saltbush, and Indian ricegrass
Elevation: 4,400 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Percent of survey area: 1.5
Mellenthin soils: 65 percent
Curhollow soils: 20 percent
Minor soils: 20 percent

Soil Properties and Qualities

Mellenthin Soil

Depth: Shallow
Drainage class: Well drained
Parent material: Alluvium from limestone
Textural class: Very gravelly loamy
Distinctive properties: Shallow soil over limestone

Curhollow Soil

Depth: Shallow to a hardpan
Drainage class: Well drained
Parent material: Alluvium from basalt and limestone
Textural class: Very gravelly loamy
Distinctive properties: Shallow soil over a hardpan

Minor Soils

- Anasazi soils
- Havasupai soils
- Prieta soils
- Manikan soil on stream terraces
- Rock outcrop

Use and Management

Major management factors: Limited available water capacity, hazard of water erosion, depth to bedrock and hardpan
Major use: Rangeland and wildlife habitat

Dominantly very shallow to very deep, well drained and somewhat excessively drained, nearly level to steep soils in the dry subhumid and subhumid climatic zone

This group consists of three map units. It makes up about 15 percent of the survey area.

This group is used mainly as grazeable woodland and wildlife habitat.

9. Royosa-Tonalea

Very deep and moderately deep, excessively drained, nearly level to rolling, sandy soils; on plateaus

Setting

Topography: Plateaus
Location: The plateau between Colorado City and Moccasin on the Kaibab Indian Reservation
Slope range: 1 to 15 percent
Vegetation: Utah juniper, pinyon, and sand sagebrush
Elevation: 5,600 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Percent of survey area: 2
Royosa soils: 60 percent
Tonalea soils: 20 percent
Minor soils: 20 percent

Soil Properties and Qualities

Royosa Soil

Depth: Very deep
Drainage class: Excessively drained
Parent material: Eolian sands from sandstone
Textural class: Sandy

Distinctive properties: Uniformly sandy profile

Tonalea Soil

Depth: Moderately deep
Drainage class: Excessively drained
Parent material: Eolian sands from sandstone
Textural class: Sandy
Distinctive properties: Moderately deep to sandstone

Minor Soils

- Rock outcrop

Use and Management

Major management factors: Hazard of wind erosion, limited available water capacity
Major use: Grazeable woodland and wildlife habitat

10. Showlow-Yumtheska-Lozinta

Very shallow and very deep, well drained and somewhat excessively drained, nearly level to steep, clayey and very gravelly and extremely gravelly loamy soils; on hills, fan terraces, and cinder cones

Setting

Topography: Hills and fan terraces
Location: Mount Trumbull area
Slope range: 1 to 50 percent
Vegetation: Utah juniper, pinon, and big sagebrush
Elevation: 5,800 to 7,200 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Percent of survey area: 11.5
Showlow soils: 25 percent
Yumtheska soils: 25 percent
Lozinta soils: 10 percent
Minor soils: 40 percent

Soil Properties and Qualities

Showlow Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium and colluvium from basalt and pyroclastics
Textural class: Clayey
Distinctive properties: Very limy layer at moderate depths

Yumtheska Soil

Depth: Very shallow and shallow
Drainage class: Well drained
Parent material: Alluvium and colluvium from limestone
Textural class: Very gravelly and loamy
Distinctive properties: Shallow soil over limestone

Lozinta Soil

Depth: Very deep (moderately deep to cinders)
Drainage class: Somewhat excessively drained
Parent material: Alluvium and colluvium from basalt and pyroclastics
Textural class: Extremely gravelly and loamy
Distinctive properties: Underlain by cinders at moderate depths

Minor Soils

- Goesling soils
- Section soils
- Wutoma soils
- Whiskey soils on stream terraces
- Thimble soils on hills
- Rock outcrop
- Lava flows

Use and Management

Major management factors: Hazard or water erosion, slope
Major use: Grazeable woodland and wildlife habitat

11. Sponiker-Godding

Very deep, well drained, nearly level to steep, clayey and very cobbly clayey soils; on hills and fan terraces

Setting

Topography: Hills and fan terraces
Location: Mount Trumbull
Slope range: 1 to 40 percent
Vegetation: Ponderosa pine and gambel oak
Elevation: 6,400 to 7,500 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 42 to 48 degrees F
Frost-free period: 90 to 135 days

Composition

Percent of survey area: 1.5
Sponiker soils: 40 percent
Godding soils: 25 percent
Minor soils: 35 percent

Soil Properties and Qualities

Sponiker Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium from basalt and pyroclastics
Textural class: Clayey
Distinctive properties: Thick dark surface layer

Godding Soil

Depth: Very deep
Drainage class: Well drained
Parent material: Alluvium and colluvium from basalt and pyroclastics
Textural class: Very cobbly and clayey
Distinctive properties: Thick dark surface layer

Minor Soils

- Wutoma and Lozinta soils
- Badlands and lava flows

Use and Management

Major management factors: Hazard of water erosion, slope
Major use: Grazeable woodland and wildlife habitat

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Barx loam, 1 to 4 percent slopes is a phase of the Barx series.

Some map units are made up of two or more major soils. These map units are called complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Showlow-Section complex, 1 to 15 percent slopes is an example.

This survey includes *miscellaneous areas*. Such

areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Soil descriptions

1—Badland

Badland consists of steep or very steep barren land that is dissected by intermittent drainage channels. The potential for runoff is very high, and geological erosion is active. Small inclusions of identifiable soils support vegetation that have very limited value for grazing by domestic livestock and wildlife.

Badland is very poorly suited to produce any vegetation for wildlife habitat. The broken topography provides some cover, roosting and nesting sites.

Interpretive Groups

Badland is not assigned a capability subclass or a range site.

2—Barx fine sandy loam, 1 to 5 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 5,000 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Barx soil and similar soils: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

0 to 2 inches—brown fine sandy loam
2 to 5 inches—brown fine sandy loam
5 to 8 inches—reddish brown sandy clay loam
8 to 28 inches—yellowish red sandy clay loam
28 to 50 inches—pink and yellowish red sandy clay loam
50 to 60 inches—reddish brown sandy clay loam

Soil Properties and Qualities

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 5 percent
• Soils that are shallow to bedrock on higher convex positions
• Soils that are moderately deep to bedrock on toeslopes of higher convex positions
• Areas of Palma loamy fine sand
• Areas of Rock outcrop
Similar inclusions:
• Areas of loamy fine sand and gravelly loam surfaces

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—blue grama, galleta, fourwing saltbush, Mormon-tea
• Present plant community—galleta, snakeweed, blue grama, threeawn
Important forage species: fourwing saltbush, Mormon-tea, galleta, blue grama
Major management factors: hazard of wind erosion
General management considerations:
• This soil responds more readily to proper management than most other soils in the survey area.
• Ground cover should be maintained or improved to reduce the hazard of erosion.
• Easy access and large variety of palatable plants encourage a constant grazing pressure.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing

Cropland

General management considerations:
• Irrigation is required for maximum production of crops.
• Suitable irrigation systems are sprinkler and trickle.
• Wind erosion can be reduced by maintaining plant cover, keeping mulch on the surface, keeping the surface of the soil rough, and limiting the width of strips of unprotected soil.

• Crops that tolerate drought are best suited. The moisture available is not adequate for good growth of other crops.
• Yields—alfalfa 4 tons, barley 4,500 pounds, wheat 3,000 pounds, pasture 12-15 AUMs.

Building Site Development

General management considerations:
• Excavation increases the risk of wind and water erosion.
Suitable management practices:
• Revegetate disturbed areas at construction sites as soon as possible to reduce the risk of wind erosion.
• Reduce the risk of erosion and maintenance cost by stabilizing areas that have been disturbed.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• To minimize subsidence, use the fill as a base for structures only after the material has been compacted.
• Consider the depth to which frost penetrates in designing footings and road bases.
• Offset the risk of corrosion to uncoated steel by using corrosion-resistant material or by using coatings and cathodic protectors.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Design roads to control surface runoff and stabilize cut slopes.
• Provide drains to control surface runoff and keep soil loss at a minimum.
• Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
• Seed road cuts and fills to permanent vegetation.

Landscaping

Suitable management practices:
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping of slopes.
• Either select plants that tolerate droughtiness or provide irrigation.

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
• Water is lacking.
• Habitat diversity is fair.

Interpretive Groups

Land capability classification: IIe, irrigated; VIe, nonirrigated
Range site: Sandy Loam Upland 10-14" p.z.

3—Barx loam, 1 to 4 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Barx soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

0 to 2 inches—brown loam
2 to 5 inches—brown fine sandy loam
5 to 8 inches—reddish brown sandy clay loam
8 to 28 inches—yellowish red sandy clay loam
28 to 50 inches—pink and yellowish red sandy clay loam
50 to 60 inches—reddish brown sandy clay loam

Soil Properties and Qualities

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: slight
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 4 percent.
• Soils that are shallow to bedrock on higher convex positions.
• Soils that are moderately deep to bedrock on toeslopes of higher convex positions.
• Areas of Rock outcrop.

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—western wheatgrass, blue grama, big sagebrush, galleta
• Present plant community—big sagebrush, blue grama, bottlebrush squirreltail, Mormon-tea
• Important forage species—western wheatgrass, blue grama, fourwing saltbush

Major management factors: none
General management considerations:
- Overuse can occur because of livestock preference for this site over other sites in the adjacent area.
- Readily responds to proper management.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Deferred grazing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
- Water is lacking.
- Habitat diversity is fair.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Range site: Loamy Upland 10-14" p.z.

4—Begay fine sandy loam, 1 to 3 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 4,900 to 5,100 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Begay soil and similar soils: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

0 to 3 inches—brown fine sandy loam
3 to 35 inches—reddish brown fine sandy loam
35 to 55 inches—reddish brown loamy fine sand
55 to 60 inches—yellowish red fine sandy loam

Soil Properties and Qualities

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: moderate
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
- Soils that are loamy fine sand throughout.
- Soils that are similar to Begay but on flood plains subject to flooding.

Similar inclusions:
- Soils that have a loamy fine sand, silt loam or silty clay loam surface.

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—Indian ricegrass, needleandthread, blue grama, big sagebrush
- Present plant community—blue grama, Indian ricegrass, big sagebrush, Mormon-tea

Important forage species: blue grama, Indian ricegrass, galleta, squirreltail
- Major management factors—hazard of wind erosion

General management considerations:
- This unit responds well to good management.
- Livestock grazing should be managed to protect the soil from excessive erosion.
- Areas where brush is removed may be subject to a greater hazard of erosion.
- Easy access and large variety of palatable plants encourage a constant grazing pressure.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Deferred grazing
- Brush management

Building Site Development

General management considerations:
- Excavation increases the risk of wind and water erosion.

Suitable management practices:
- Revegetate disturbed areas at construction sites as soon as possible to reduce the risk of wind erosion.
- Reduce the risk of erosion and maintenance cost by stabilizing areas that have been disturbed.
- Preserve the existing plant cover during construction to reduce the risk of erosion.
- To minimize subsidence, use the fill as a base for structures only after the material has been compacted.
- Consider the depth to which frost penetrates in designing footings and road bases.
- Offset the risk of corrosion to uncoated steel by

using corrosion-resistant material or by using coatings and cathodic protectors.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Design roads to control surface runoff and stabilize cut slopes.
• Provide drains to control surface runoff and keep soil loss at a minimum.
• Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
• Seed road cuts and fills to permanent vegetation.

Landscaping

Suitable management practices:
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping of slopes.
• Either select plants that tolerate droughtiness or provide irrigation.

Wildlife Habitat

Suitability for grasses, forbs, and shrubs: moderately suited
• Rangeland wildlife such as pronghorn, horned lark, and lark bunting use this area extensively.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Range site: Sandy Loam Upland, Calcareous 10-14" p.z.

5—Begay fine sandy loam, 3 to 12 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 5,000 to 5,300 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Begay soil and similar soils: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Rock fragments on surface: 1 percent cobble
0 to 3 inches—brown fine sandy loam
3 to 35 inches—reddish brown fine sandy loam
35 to 55 inches—reddish brown loamy fine sand
55 to 60 inches—yellowish red fine sandy loam

Soil Properties and Qualities

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: moderate
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: very severe
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 12 percent.
• Soils that are clayey throughout.
• Areas of badland.
• Soils that are similar but on flood plains subject to flooding.
• Soils that have up to 10 percent stones.
• Soils that are loamy fine sand throughout.
• Soils that have more than 35 percent gravel.
Similar inclusions:
• Soils that have loam, silt loam, loamy fine sand or silty clay loam surfaces.
• Soils that have sandy clay loam at depths of 5 to 20 inches.
• Soils that have slopes of less than 3 percent.

Use and Management

Grazeable Woodland

Dominant vegetation:
• Potential plant community—blue grama, needleandthread, Indian ricegrass, juniper
• Present plant community—blue grama, Indian ricegrass, big sagebrush, juniper
Important forage species: blue grama, Indian ricegrass, galleta, squirreltail
Major management factors: hazard of wind erosion, hazard of water erosion
General management considerations:
• This unit responds well to good management.
• Livestock grazing should be managed to protect the soil from excessive erosion.
• Areas where brush is removed may be subject to a greater hazard of erosion.
• Easy access and large variety of palatable plants encourage a constant grazing pressure.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing
• Brush management

Wildlife Habitat

Suitability for coniferous trees: moderately suited
Management considerations:
• These woodlands provide habitat for many species.
• Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Woodland site: Sandy Loam Upland, Moderately Deep 10-14" p.z.

6—Bidonia-Bond-Rock outcrop complex, 1 to 25 percent slopes

Setting

Landform: plateaus and mesas
Flooding: none
Slope range: Bidonia—1 to 8 percent; Bond—2 to 25 percent
Elevation: 5,000 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Bidonia and similar soils: 35 percent
Bond and similar soils: 30 percent
Rock outcrop: 15 percent
Contrasting inclusions: 20 percent

Typical Profile

Bidonia

0 to 1 inch—light brown very channery loam
1 to 3 inches—light brown channery fine sandy loam
3 to 10 inches—reddish brown clay
10 to 14 inches—yellowish red channery clay loam
14 inches—sandstone

Bond

0 to 5 inches—strong brown gravelly sandy loam
5 to 12 inches—strong brown sandy clay loam
12 to 17 inches—brown sandy clay loam
17 to 19 inches—light brown sandy clay loam
19 inches—sandstone

Rock outcrop

Consists of exposed area of sandstone (fig. 3)

Soil Properties and Qualities

Bidonia

Parent material: alluvium from sandstone
Depth class: shallow
Drainage class: well drained
Permeability: slow
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of wind erosion: very slight
Hazard of water erosion: slight
Shrink-swell potential: high

Bond

Parent material: alluvium from sandstone
Depth class: shallow
Drainage class: well drained
Permeability: moderately slow
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
• Soils that have greater than 35 percent rock fragments.
• Soils that are moderately deep and deep on toeslopes.
• Soils that have slopes of more than 25 percent.

Use and Management

Grazeable Woodland-Rangeland

Dominant vegetation on Bidonia soil:
• Potential plant community—Indian ricegrass, needleandthread, pinyon, juniper
• Present plant community—sagebrush, blue grama, pinyon, juniper
Important forage species: Indian ricegrass, needleandthread, fourwing saltbush, Mexican cliffrose
Dominant vegetation on Bond soil:
• Potential plant community—black grama, needleandthread, blue grama, big sagebrush
• Present plant community—blue grama, squirreltail, sagebrush
Important forage species: black grama, blue grama, fourwing saltbush, galleta
Major management factors: very low available water capacity, depth to bedrock, hazard of water erosion, slope
General management considerations on the Bidonia and Bond soils:
• This unit is limited for earthen water impoundments because of shallow depth to bedrock.

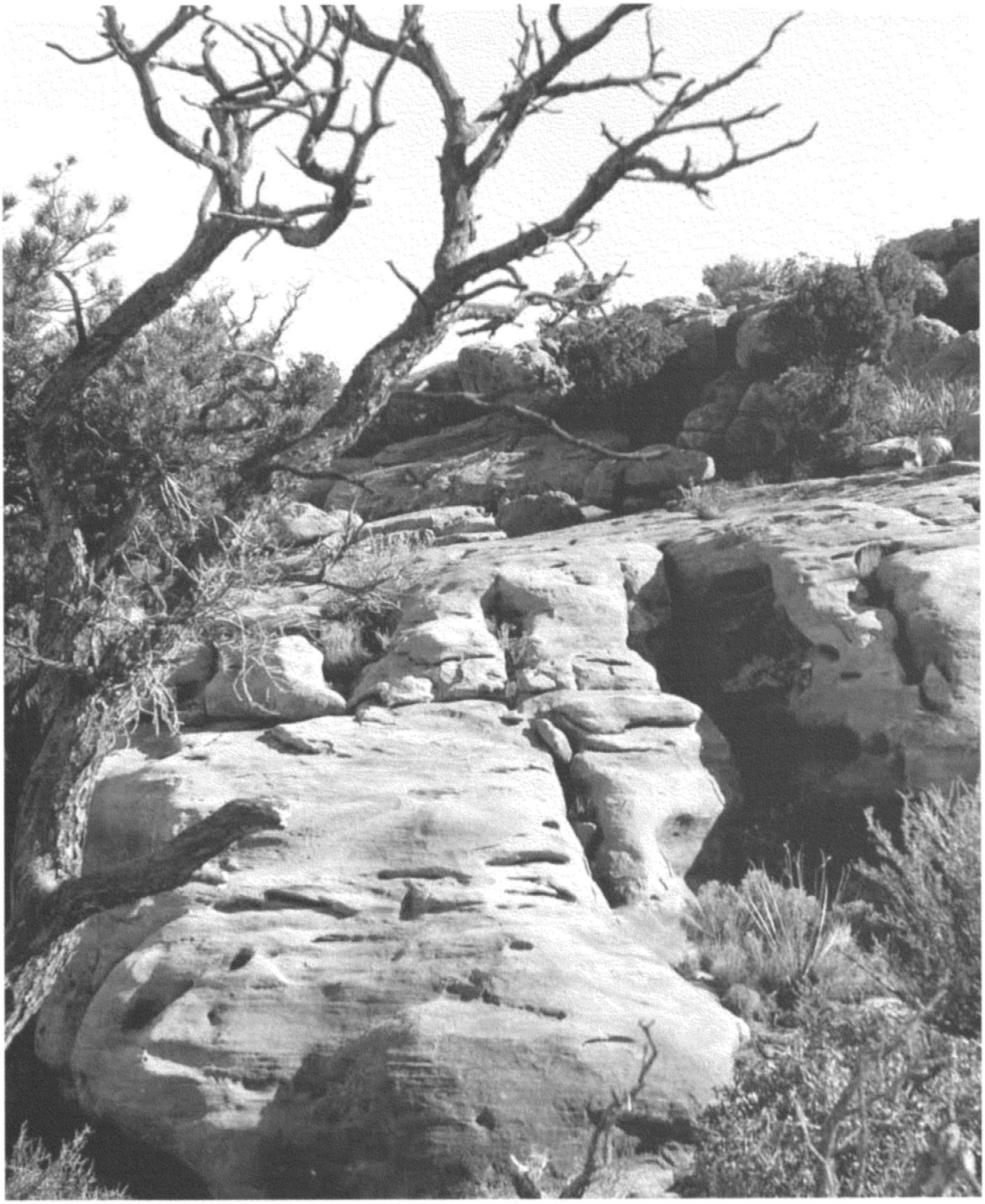

Figure 3.—Areas of Rock outcrop in Bidonia-Bond-Rock outcrop complex, 1 to 25 percent slopes. The range production capacity is severely limited by the presence of Rock outcrop.

• Wood production on the Bidonia part is 2-3 cords per acre.
• Ground cover should be maintained or improved to reduce the hazard of wind erosion.
• Range seeding is limited because of low available water capacity.

Suitable management practices on the Bidonia and Bond soils:
• Proper grazing use
• Planned grazing system
• Deferred grazing

Wildlife Habitat

Suitability of the Bidonia soil for coniferous trees: moderately suited
Management considerations:
• These woodlands of pinyon-juniper provide habitat for many species.
• Firewood gatherers should not disturb nest trees.

Suitability of the Bond soil for herbaceous plants and shrubs: moderately suited
Management considerations:
• Scattered pinyon-juniper trees add structural diversity.
• Rock outcrop grows no vegetation but is important for nest sites, resting cover, hunting perches, escape, and dens.

Interpretive Groups

Land capability classification: Bidonia soil—VIs, nonirrigated; Bond soil—VIs, nonirrigated
Woodland site: Bidonia soil—Sandstone Upland 10-14" p.z.
Range site: Bond soil—Shallow Loamy 10-14" p.z.

7—Bond-Bidonia complex, 1 to 7 percent slopes

Setting

Landform: plateaus and mesas
Landscape position: Bond—intermingled has the fewest trees; Bidonia—intermingled has the most trees
Slope range: Bond soil—1 to 5 percent; Bidonia—1 to 7 percent
Flooding: none
Elevation: 5,000 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Bond and similar soils: 65 percent
Bidonia and similar soils: 15 percent
Contrasting inclusions: 20 percent

Typical Profile

Bond

Rock fragments on the surface: 5 percent gravel
0 to 5 inches—light brown fine sandy loam
5 to 12 inches—brown sandy clay loam
12 to 17 inches—brown sandy clay loam
17 to 19 inches—light brown sandy clay loam
19 inches—sandstone

Bidonia

0 to 1 inch—light brown sandy loam
1 to 3 inches—light brown channery fine sandy loam
3 to 10 inches—reddish brown clay
10 to 14 inches—yellowish red channery clay loam
14 inches—sandstone

Soil Properties and Qualities

Bond

Parent material: alluvium from sandstone
Depth class: shallow
Drainage class: well drained
Permeability: moderately slow
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Bidonia

Parent material: alluvium from sandstone
Depth class: shallow
Drainage class: well drained
Permeability: slow
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high
Shrink-swell potential: high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 7 percent.
- Soils that are shallow that have sandy loam, loam or clay loam subsurface layers.
- Areas of Rock outcrop.
- Soils that are moderately deep and deep, on some toeslopes.

Similar inclusions:
- Soils that have a loam, sandy clay loam or clay loam surface.

Use and Management

Rangeland-Grazeable Woodland

Dominant vegetation on the Bond soil:
- Potential plant community—black grama, blue grama, needleandthread, big sagebrush
- Present plant community—sagebrush, blue grama, squirreltail

Important forage species: black grama, blue grama, fourwing saltbush, Mexican cliffrose
Dominant vegetation on the Bidonia soil:
- Potential plant community—Indian ricegrass, needleandthread, pinyon, juniper
- Present plant community—blue grama, sagebrush, pinyon, juniper

Important forage species: Indian ricegrass, needleandthread, fourwing saltbush, galleta
Major management factors: depth to bedrock, very low available water capacity, hazard of wind erosion
General management considerations on the Bond and Bidonia soils:
- Range seeding is limited because of low available water capacity.
- This unit is limited for earthen water impoundments because of shallow depth to bedrock.
- Ground cover should be maintained or improved to reduce the hazard of wind erosion.
- Wood production on the Bidonia part is 2-3 cords per acre.

Suitable management practices on the Bond and Bidonia soils:
- Proper grazing use
- Planned grazing system
- Deferred grazing

Wildlife Habitat

Suitability of the Bond soil for herbaceous plants and shrubs: poorly suited
Management consideration:
- Scattered pinyon-juniper trees add structural diversity to this open grassland.

Suitability of the Bidonia soil for coniferous trees: poorly suited
Management considerations:
- These woodlands of pinyon-juniper provide habitat for many species.
- Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: Bond—VIs, nonirrigated; Bidonia—VIs, nonirrigated
Range site: Bond soil—Shallow Loamy 10-14" p.z.
Woodland site: Bidonia soil—Sandstone Upland 10-14" p.z.

8—Brinkerhoff-Grieta complex, 0 to 5 percent slopes

Setting

Landform: fan terraces
Slope range: Binkerhoff—0 to 5 percent; Grieta—1 to 5 percent
Flooding: none
Elevation: 4,600 to 5,100 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Brinkerhoff and similar soils: 65 percent
Grieta and similar soils: 20 percent
Contrasting inclusions: 15 percent

Typical Profile

Brinkerhoff

Rock fragments on the surface: 5 percent gravel
0 to 4 inches—brown sandy loam
4 to 17 inches—yellowish red sandy loam
17 to 28 inches—light brown loamy sand
28 to 50 inches—light brown and reddish brown gravelly coarse sand high in gypsum
50 to 60 inches—strong brown gravelly coarse sand

Grieta

0 to 3 inches—brown fine sandy loam
3 to 21 inches—dark brown loam
21 to 25 inches—brown loam
25 to 36 inches—light brown loam
36 to 60 inches—light brown loam

Soil Properties and Qualities

Brinkerhoff

Parent material: alluvium from sandstone and gypsiferous shale
Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: low
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: slight
Hazard of wind erosion: moderately high
Corrosivity: Concrete—high

Grieta

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 5 percent.
• Areas of Monue soils.
Similar inclusions:
• Soils that are similar to Brinkerhoff but without a clay increase in the profile and that have a higher gypsum content.
• Soils that are similar to Grieta but that have a lower clay content in the subsoil.

Use and Management

Rangeland

Dominant vegetation on the Brinkerhoff soil:
• Potential plant community—Indian ricegrass, blue grama, black grama, needleandthread
• Present plant community—squirreltail, needle grasses, blue grama, Mormon-tea
Important forage species: Indian ricegrass, blue grama, black grama, fourwing saltbush
Dominant vegetation on the Grieta soil:
• Potential plant community—Indian ricegrass, blue grama, black grama, needleandthread
• Present plant community—needleandthread, blue grama, squirreltail, Mormon-tea
Important forage species: Indian ricegrass, blue grama, black grama, fourwing saltbush
Major management factors: hazard of wind erosion, low available water capacity
General management considerations on the Brinkerhoff and Grieta soils:
• Ground cover should be maintained or improved to reduce the hazard of erosion by wind.
• This unit responds well to proper management.
• Water impoundments are limited because of seepage potential.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing

Wildlife Habitat

Suitability of the Brinkerhoff and Grieta soils for herbaceous plants and shrubs: moderately suited

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Sandy Loam Upland, Calcareous 7-11" p.z.

9—Campanile clay, 1 to 6 percent slopes

Setting

Landform: mesas and hills
Flooding: none
Elevation: 4,800 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Campanile soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

0 to 60 inches—reddish brown clay

Soil Properties and Qualities

Parent material: alluvium from shale
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderate
Shrink-swell potential: high

Inclusions

Contrasting inclusions:

• Soils that occasionally flood—in the Short Creek sinks. These soils are clay over sand or loam.
• Soils that have slopes of more than 3 percent.
• Soils that are loamy.
• Soils that have a high content of gypsum.
• Soils that are shallow to weathered bedrock.
• Soils that are moderately deep to decomposing shale.
Similar inclusions:
• Soils that have a loam, sandy clay loam, or clay surface.

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—blue grama, western wheatgrass, Indian ricegrass, galleta
• Present plant community—bottlebrush squirreltail, blue grama, fourwing saltbush, galleta
• Important forage species—western wheatgrass, Indian ricegrass, galleta
Major management factors: shrink-swell, slow permeability
General management considerations:
• Ground cover should be maintained or improved to prevent erosion hazard.
• Desirable grasses are slow to recover on this unit because of the lack of a seed source and the competition from shrubby species for moisture.
• Cool season species benefit from deferred grazing.
• Seed only plants that tolerate shrinking and swelling.
• Grazing should be delayed until the soil has dried sufficiently to withstand trampling and compaction.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing

Cropland

General management considerations:
• Low annual precipitation limits the crops that can be grown on this soil.
• Crops that tolerate drought are best suited. The moisture available is not adequate for good growth of other crops.
• Irrigation is required for maximum production of crops.
• This soil is suited to most irrigation systems.
• If sprinklers are used, apply water slowly to minimize runoff.
• Wind erosion can be reduced by maintaining plant cover, keeping mulch on the surface, keeping the surface of the soil rough, and limiting the width of strips of unprotected soil.

Wildlife Habitat

Suitability for herbaceous plants and shrubs: well suited
Management consideration:
• The plant diversity attracts many wildlife species.

Interpretive Groups

Land capability classification: IIIe, irrigated; VIs, nonirrigated
Range site: Clay Upland 10-14" p.z.

10—Clayhole loam, 1 to 3 percent slopes

Setting

Landform: alluvial fans
Flooding: rare
Elevation: 4,400 to 5,000 feet
Mean annual precipitation: 6 to 10- inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Clayhole soil and similar soils: 95 percent
Contrasting inclusions: 5 percent

Typical Profile

0 to 2 inches—reddish brown loam
2 to 60 inches—yellowish red loam that is high in gypsum

Soil Properties and Qualities

Parent material: alluvium from gypsiferous shale
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: moderate
Potential rooting depth: 60 inches or more
Runoff: slow to medium
Hazard of water erosion: slight
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 3 percent.
• Areas of Mido loamy fine sand on fan terraces.

• Soils that are less than 20 inches to weathered shale.
• Areas of Jocity on stream terraces.
Similar inclusions:
• Soils that are similar to Clayhole but on stream terraces.
• Soils that are moderately deep to weathered shale.
• Soils that have less than 18 percent clay in the profile.
• Soils that have a silt loam or sandy loam surface.

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—Indian ricegrass, gyp dropseed, galleta, shadscale
• Present plant community—gyp dropseed, galleta, Indian ricegrass, shadscale
Important forage species: galleta, Indian ricegrass, fourwing saltbush
Major management factors: content of gypsum, subsidence, sheet flooding
General management considerations:
• Forage for livestock is limited by the high content of gypsum.
• Livestock grazing should be managed to protect the soil from excessive erosion.
• Lack of seed source and competition from shrubby species for moisture make desirable grasses slow to recover.
• This unit has a relatively low productivity of forage plants.
• Range seeding is a marginal practice on this soil.
• The high erosive potential of this soil necessitates more intensive management
Suitable management practices:
• Proper grazing use
• Planned grazing system
• Fencing
• Deferred grazing

Wildlife Habitat

Suitability for herbaceous plant and shrubs: moderately suited
Management considerations:
• This unit has good plant diversity for wildlife use.
• Competition between wildlife and cattle can be severe during all seasons.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
Range site: Gypsum Upland 7-11" p.z.

11—Curhollow-Prieta complex, 4 to 20 percent slopes

Setting

Landform: Curhollow—fan terraces; Prieta—hills
Flooding: none
Slope range: 4 to 20 percent;
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Curhollow and similar soils: 45 percent
Prieta and similar soils: 35 percent
Contrasting inclusions: 20 percent

Typical Profile

Curhollow

Rock fragments on the surface: 20 percent gravel, 5 percent cobble, 1 percent stones
0 to 2 inches—strong brown gravelly loam
2 to 5 inches—dark brown very gravelly loam
5 to 12 inches—brown very gravelly loam
12 to 22 inches—hardpan
22 inches—basalt

Prieta

Rock fragments on the surface: 25 percent gravel, 10 percent cobble, 1 percent stones
0 to 2 inches—brown very gravelly loam
2 to 6 inches—brown very gravelly silty clay loam
6 to 16 inches—dark brown very gravelly silty clay
16 inches—basalt

Soil Properties and Qualities

Curhollow

Parent material: alluvium from basalt and limestone
Depth class: shallow to a hardpan
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium to rapid
Hazard of water erosion: very severe
Hazard of wind erosion: slight
Shrink-swell potential: low

Prieta

Parent material: alluvium from basalt and pyroclastics
Depth class: shallow

Drainage class: well drained
Permeability: slow
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium to very rapid
Hazard of water erosion: moderate
Hazard of wind erosion: very slight
Shrink-swell potential: moderate

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 20 percent.
• Deep and moderately deep loamy soils on fan terraces and broad ridges.
• Areas of Poley silty clay loam on fan terraces.
Similar inclusions:
• Soils that are similar to Prieta but having a redder color.
• Soils that have slopes of less than 4 percent.

Use and Management

Rangeland

Dominant vegetation on the Curhollow and Prieta soil:
• Potential plant community—needle grasses, black grama, big sagebrush, winterfat
• Present plant community—big sagebrush, galleta, winterfat
• Important forage species—black grama, western wheatgrass, squirreltail, winterfat
Major management factors: depth to hardpan or bedrock, very low available water capacity, hazard of water erosion
General management considerations on the Curhollow and Prieta soils:
• On this unit a lack of seed source and the competition from shrubby species for moisture make desirable grasses slow to recover.
• Seeding on this unit is not practical because of low productivity potential.
• This unit responds less readily to management than other soils in the area.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing

Wildlife Habitat

Suitability of the Curhollow and Prieta soils for herbaceous plants and shrubs: moderately suited
Management consideration:
• Scattered pinyon-juniper trees add structural diversity to this open grassland.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Range site: Basalt Upland 10-14" p.z.

12—Godding gravelly loam, 3 to 40 percent slopes

Setting

Landform: hills and fan terraces
Flooding: none
Elevation: 7,200 to 7,500 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 42 to 45 degrees F
Frost-free period: 90 to 120 days

Composition

Godding soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

Rock fragments on surface: 20 percent gravel
1 to 0 inch—pine needles
0 to 5 inches—dark reddish brown gravelly loam
5 to 12 inches—dark reddish brown gravelly clay loam
12 to 41 inches—dark reddish brown very cobbly clay
41 to 60 inches—dark reddish brown very cobbly clay loam

Soil Properties and Qualities

Parent material: alluvium and colluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: moderate
Potential rooting depth: 60 or more inches
Runoff: medium to rapid
Hazard of water erosion: very severe
Hazard of wind erosion: very slight
Shrink-swell potential: high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 40 percent.
• Loamy soils on stream terraces.
• Cliffs, escarpments, and rubbleland
• Soils that have cinders at 10 to 30 inches.
• Soils shallow and moderately deep to bedrock.
Similar inclusions:
• Soils that are similar to Godding but that have bedrock at 20 to 40 inches.

• Soils that are similar to Godding but having redder hues.
• Soils that have slopes of less than 3 percent.

Use and Management

Grazeable Woodland

Dominant vegetation:
• Potential plant community—Ponderosa pine, muttongrass, juniper, pinyon
• Present plant community—Ponderosa pine, juniper, pinyon, Arizona fescue
Important forage species: muttongrass, mountain muhly, squirreltail
Major management factors: slow permeability, hazard of water erosion, slope
General management considerations:
• A moderate erosion hazard requires care in using equipment during harvest.
• Moderate erosion hazard and steep slopes limit vehicle access.
• Grazing should be excluded from areas of harvesting and plantations until native species have become well established.
• Steep slopes limit livestock access, which results in overgrazing of the less sloping areas.
Suitable management practices:
• Proper woodland grazing
• Access roads
• Forest land erosion control system
• Forest land management
• Woodland improved harvesting
• Woodland improvement

Wildlife Habitat

Suitability for coniferous trees: moderately suited
Management considerations:
• These woodlands of ponderosa pine provide habitat for many species.
• Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Woodland site: Loamy Upland 17-22" p.z.

13—Grieta fine sandy loam, 1 to 5 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 4,700 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Grieta soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

0 to 3 inches—brown fine sandy loam
3 to 21 inches—dark brown loam
21 to 25 inches—brown loam
25 to 36 inches—light brown loam
36 to 60 inches—light brown loam

Soil Properties and Qualities

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 5 percent.
• Soils that are moderately deep to bedrock.
• Areas of Pennell soils on higher convex positions.
• Areas of Sheppard soils.

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—galleta, blue grama, fourwing saltbush, Mormon-tea
• Present plant community—squirreltail, galleta, blue grama, Mormon-tea
• Important forage species—galleta, blue grama, fourwing saltbush, Mormon-tea
Major management factors: hazard of wind erosion
General management considerations:
• Ground cover should be maintained or improved to reduce erosion hazard.
• Readily responds to proper management.
Suitable management practices:
• Proper grazing use
• Fencing
• Deferred grazing

• Water developments

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
• Open rangeland wildlife prefer this site.
• Water is lacking.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Sandy Loam Upland 7-11" p.z.

14—Grieta loam, 1 to 5 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 4,700 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Grieta loam soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

0 to 3 inches—brown loam
3 to 21 inches—dark brown loam
21 to 25 inches—brown loam
25 to 36 inches—light brown loam
36 to 60 inches—light brown loam

Soil Properties and Qualities

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 5 percent.
• Areas of Palma sandy loam.
• Areas of Jocity loam and silty clay loam on stream terraces.
• Areas of Begay sandy loam.

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—Indian ricegrass, needleandthread, squirreltail, fourwing saltbush
• Present plant community—threeawn, galleta, Indian ricegrass, fourwing saltbush
• Important forage species—Indian ricegrass, squirreltail, fourwing saltbush, galleta
Major management factors: droughty
General management considerations:
• Overuse can occur because livestock prefer this site over other sites in the adjacent area.
• Use brush management in areas where unpalatable species have increased significantly.
• Planned grazing systems help to gain better livestock distribution.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Brush management

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
• Open rangeland wildlife prefer this site.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
Range site: Loamy Upland 7-11" p.z.

15—Gypsiorthids-Gypsiorthids, shallow complex, 1 to 50 percent slopes

Setting

Landform: fan terraces and hills (fig. 4)
Flooding: none
Slope range: 1 to 50 percent
Elevation: 4,400 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Gypsiorthids and similar soils: 60 percent
Gypsiorthids, shallow and similar soils: 35 percent

Contrasting inclusions: 5 percent

Reference Profile

Gypsiorthids

0 to 2 inches—brown silt loam
2 to 13 inches—very pale brown coarse sandy loam
13 to 31 inches—light brownish gray loamy coarse sand
31 to 60 inches—light brownish gray coarse sandy loam

Gypsiorthids, shallow

0 to 1 inch—strong brown silt loam
1 to 7 inches—light brown coarse sandy loam
7 inches—weathered gypsiferous shale

Soil Properties and Qualities

Gypsiorthids

Parent material: alluvium from gypsiferous shales
Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: low
Potential rooting depth: 60 inches or more
Runoff: slow to very rapid
Hazard of water erosion: very severe
Hazard of wind erosion: moderate
Corrosivity: concrete—high

Gypsiorthids, shallow

Parent material: alluvium from gypsiferous shales
Depth class: very shallow and shallow
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: very low
Potential rooting depth: 4 to 20 inches
Runoff: slow to very rapid
Hazard of water erosion: very severe
Hazard of wind erosion: moderate
Corrosivity: concrete—high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 50 percent
- Areas of Pennell soils on hills
- Areas of Brinkerhoff soils on fan terraces

Figure 4.—Areas of Gypsiorthids-Gypsiorthids, shallow complex, 1 to 50 percent slopes, with the Vermillion Cliffs mapped as Torriorthents-Rock outcrop complex, 30 to 70 percent slopes.

Use and Management

Rangeland

Dominant vegetation on the Gypsiorthids soil:
- Potential plant community—Indian ricegrass, needleandthread, galleta, shadscale
- Present plant community—galleta, gyp dropseed, shadscale, Princess plume
- Important forage species—galleta, Indian ricegrass, squirreltail, fourwing saltbush

Dominant vegetation on the Gypsiorthids, shallow soil:
- Potential plant community—gyp dropseed, galleta, buckwheat, Utah serviceberry

Present plant community—gyp dropseed, fourwing saltbush, shadscale, bigelow sagebrush
- Important forage species—galleta, squirreltail, fourwing saltbush, cliffrose

Major management factors: slope, content of gypsum, depth to bedrock, available water capacity, hazard of water erosion

General management considerations on the Gypsiorthids and Gypsiorthids, shallow soils:
- On the Gypsiorthids shallow part, slope limits access by livestock and results in overgrazing of the less sloping areas.
- On the Gypsiorthids part, production of vegetation suitable as forage is limited by the high gypsum content.
- Desirable grasses are slow to recover even under the best management.
- Cattle usually avoid areas of this unit unless their movement is restricted by fencing.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Deferred grazing

Building Site Development

General management considerations:
- Introduction of water in any amount will cause some degree of subsidence because of the gypsum content of the soil.
- Excavation increases the risk of wind and water erosion.
- The deep cuts needed to level the road surface can expose soft bedrock; however, it can be easily excavated.
- Septic tank absorption fields may function poorly because of the limited soil depth.

Suitable management practices:
- Rain gutters should be used to dump the rain at least 6 feet from the foundations.
- Revegetate disturbed areas at construction sites as soon as possible to reduce the risk of wind erosion.
- Reduce the risk of erosion and maintenance cost by stabilizing areas that have been disturbed.
- Preserve the existing plant cover during construction to reduce the risk of erosion.
- Consider the depth to which frost penetrates in designing footings and road bases.
- Offset the risk of corrosion to concrete and uncoated steel pipe by using sulfate-resistant cement and treated steel pipe that have cathodic protectors.
- Install culverts to carry seasonal runoff where roads cross natural drainageways.
- Design roads to control surface runoff and stabilize cut slopes.
- Provide drains to control surface runoff and keep soil loss at a minimum.
- Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
- Seed road cuts and fills to permanent vegetation.

Landscaping

Suitable management practices:
- Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping of slopes.
- Either select plants that tolerate droughtiness or provide irrigation.
- The soil should not be irrigated within 4 feet of the foundation because of the potential for subsidence.

Wildlife Habitat

Suitability of the Gypsiorthids soil for herbaceous plants and shrubs: poorly suited
- Water is lacking

Suitability for the Gypsiorthids, shallow soil for herbaceous plants and shrubs: moderately suited
- This part has fair plant diversity for wildlife use.
- Competition between wildlife and cattle can be severe during all seasons.

Interpretive Groups

Land capability classification: Gypsiorthids soil—VIIs, nonirrigated; Gypsiorthids, shallow soil—VIIs, nonirrigated

Range site: Gypsiorthids soil—Gypsum Upland 7-11" p.z.; Gypsiorthids, shallow soil—Gypsum Hills 7-11" p.z.

16—Hatknoll-Kinan complex, 1 to 10 percent slopes

Setting

Landform: fan terraces
Flooding: none
Slope range: 1 to 10 percent
Elevation: 4,700 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Hatknoll and similar soils: 50 percent
Kinan and similar soils: 35 percent
Contrasting inclusions: 15 percent

Typical Profile

Hatknoll

Rock fragments on the surface: 5 percent gravel
0 to 3 inches—dark brown silty clay loam
3 to 20 inches—dark brown silty clay
20 to 25 inches—reddish brown gravelly silty clay
25 to 60 inches—light brown loam

Kinan

Rock fragments on the surface: 30 percent gravel
0 to 7 inches—brown gravelly loam
7 to 14 inches—yellowish red gravelly loam
14 to 28 inches—pink loam
28 to 44 inches—light reddish brown loam
44 to 51 inches—yellowish red channery loam
51 to 60 inches—reddish brown very channery sandy clay loam

Soil Properties and Qualities

Hatknoll

Parent material: alluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight
Shrink-swell potential: high

Kinan

Parent material: alluvium from limestone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: moderate
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate to severe
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 10 percent.
• Soils that have more than 35 percent rock fragments and that have a high content of lime.
Similar inclusions:
• Loamy soils that have more than 18 percent clay in the profile.

Use and Management

Rangeland

Dominant vegetation on the Hatknoll soil:
• Potential plant community—galleta, fourwing saltbush, Indian ricegrass, Mormon-tea
• Present plant community—galleta, squirreltail, blue grama, rabbit brush
• Important forage species—galleta, fourwing saltbush, squirreltail, Mormon-tea
Dominant vegetation on the Kinan soil:
• Potential plant community—black grama, blue grama, Indian ricegrass, needleandthread
• Present plant community—gramas, needlegrasses, squirreltail, threeawn
• Important forage species—Indian ricegrass, blue grama, black grama, fourwing saltbush
Major management factors: hazard of water erosion (Kinan), slow permeability (Hatknoll)
General management considerations on the Hatknoll and Kinan soils:
• Vegetation of the Hatknoll part is difficult to restore once the plant cover has been altered.
• Ground cover should be maintained or improved to reduce the hazard of erosion.
• Kinan part responds well to good management.
• Good livestock distribution is necessary to use the forage properly.
Suitable management practices:

- Proper grazing use
- Planned grazing systems
- Fencing
- Deferred grazing

Wildlife Habitat

Suitability of the Hatknoll and Kinan soil for herbaceous plants and shrubs: moderately suited
Management consideration:
- Open rangeland wildlife prefer this site.

Interpretive Groups

Land capability classification: Hatknoll—VIIs, nonirrigated; Kinan—VIIe, nonirrigated
Range site: Hatknoll—Clayey Upland 7-11" p.z.; Kinan—Loamy Upland 7-11" p.z.

17—Havasupai-Mellenthin complex, 2 to 12 percent slopes

Setting

Landform: Havasupai—fan terraces; Mellenthin—hills;
Flooding: none
Slope range: Havasupai—2 to 8 percent; Mellenthin—2 to 12 percent
Elevation: 4,800 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Havasupai and similar soils: 65 percent
Mellenthin and similar soils: 15 percent
Contrasting inclusions: 20 percent

Typical Profile

Havasupai

0 to 2 inches—brown very gravelly loam
2 to 9 inches—brown gravelly loam
9 to 17 inches—brown extremely gravelly loam
17 to 35 inches—hardpan
35 to 60 inches—light brown extremely gravelly sandy loam

Mellenthin

0 to 8 inches—brown very gravelly loam
8 to 15 inches—light brown very gravelly loam
15 inches—fractured limestone

Soil Properties and Qualities

Havasupai

Parent material: alluvium from limestone
Depth class: shallow to a hardpan
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of water erosion: slight
Hazard of wind erosion: very slight

Mellenthin

Parent material: alluvium from limestone
Depth class: shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
- Soils that are deep and moderately deep on toeslopes and stream terraces.
- Areas of Rock outcrop.
- Soils that have slopes of more than 15 percent.
- Areas that have 1 to 10 percent stones on the surface.

Similar inclusions:
- Soils that are similar to Mellenthin but less than 35 percent rock fragments.
- Soils that have a surface texture of gravelly loam, gravelly sandy loam or cobbly loam.
- Soils that are less than 10 inches to bedrock.
- Soils that are similar to Havasupai but that have redder color.

Use and Management

Rangeland

Dominant vegetation on the Havasupai soil:
- Potential plant community—Indian ricegrass, needleandthread, big sagebrush, blue grama
- Present plant community—big sagebrush, galleta, blue grama

• Important forage species—black grama, Indian ricegrass, bottlebrush squirreltail, galleta

Dominant vegetation on the Mellenthin soil:

• Potential plant community—Indian ricegrass, galleta, big sagebrush, needleandthread

• Present plant community—big sagebrush, blue grama

• Important forage species—black grama, Indian ricegrass, bottlebrush, squirreltail, galleta

Major management factors: very low available water capacity, depth to bedrock or hardpan, Rock outcrop

General management considerations on the Havasupai and Mellenthin soils:

• Suitable forage for livestock is limited by lime.

• Lack of seed source and competition from shrubby species for moisture makes desirable grasses slow to recover.

• Water development is limited because of the shallow depth to bedrock.

• Low productivity potential makes seeding not practical on this unit.

Suitable management practices:

• Proper grazing use
• Fencing
• Planned grazing system
• Deferred grazing

Wildlife Habitat

Suitability of the Havasupai and Mellenthin soils for herbaceous plants and shrubs: moderately suited

Management considerations:

• Scattered pinyon-juniper trees add structural diversity to this open grassland.

• The Rock outcrop grows no vegetation but is important for nest sites, resting cover, hunting perches, escape, and dens.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Range site: Shallow Loamy 10-14" p.z.

18—Jocity loamy fine sand, saline-sodic, 1 to 3 percent slopes

Setting

Landform: stream terraces
Flooding: none to rare
Elevation: 4,700 to 4,900 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Jocity soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

0 to 4 inches—brown loamy fine sand
4 to 23 inches—brown silt loam
23 to 34 inches—brown loam
34 to 46 inches—brown silt loam
46 to 60 inches—brown loam

Soil Properties and Qualities

Parent material: mixed alluvium
Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Available water capacity: moderate
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: slight with gullying potential
Hazard of wind erosion: high
Salinity: very slightly saline (ECe 2-4 mmhos)

Inclusions

Contrasting inclusions:

• Soils that have slopes of more than 3 percent
• Soils that are loamy sand throughout.
• Soils on flood plains.
• Soils that are strongly alkaline.

Similar inclusions:

• Soils averaging less than 18 percent clay in the profile.

• Soils that have silty clay loam, silty clay or loam surfaces.

Use and Management

Rangeland

Dominant vegetation:

• Potential plant community—western wheatgrass, ricegrass, fourwing saltbush, greasewood

• Present plant community—Inland saltgrass, greasewood, shadscale

Important forage species: western wheatgrass, Indian ricegrass, squirreltail

Major management factors: salinity, hazard of wind erosion, gullying potential

General management considerations:
• Ground cover should be maintained or improved to reduce the high erosion hazard.
• When disturbed serious erosion occurs.
• Good livestock distribution needed in order to properly utilize the forage.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
• Water may stand on the flat areas after rainstorms.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Saline Upland, Loamy 7-11" p.z.

19—Jocity-Clayhole complex, 1 to 4 percent slopes

Setting

Landform: Jocity—stream terraces; Clayhole—alluvial fans
Landscape position: Jocity—lower more level slopes
Flooding: Jocity—rare; Clayhole—rare
Slope range: 1 to 4 percent
Elevation: 4,400 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Jocity and similar soils: 50 percent
Clayhole and similar soils: 30 percent
Contrasting inclusions: 20 percent

Typical Profile

Jocity

0 to 4 inches—brown silty clay loam
4 to 23 inches—brown silt loam
23 to 34 inches—brown loam
34 to 46 inches—brown silt loam
46 to 60 inches—brown loam

Clayhole

0 to 2 inches—reddish brown silty clay loam
2 to 60 inches—yellowish red loam, high in gypsum

Soil Properties and Qualities

Jocity

Parent material: mixed alluvium
Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Available water capacity: very high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate with gullying potential
Hazard of wind erosion: moderate

Clayhole

Parent material: alluvium from gypsiferous shale
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: moderate
Potential rooting depth: 60 inches or more
Runoff: slow
Hazard of water erosion: moderate with gullying potential
Hazard of wind erosion: moderate
Subsidence: some potential for differential settlement
Gypsum content: 15 to 45 percent
Corrosivity: Concrete—high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 4 percent.
• Areas of Brinkerhoff on fan terraces.
• Areas of Grieta on fan terraces
• Soils that are similar to Clayhole but sandy loam throughout.
• Areas of gullies.

Use and Management

Rangeland

Dominant vegetation on the Jocity soil:
• Potential plant community—galleta, winterfat, fourwing saltbush, Indian ricegrass
• Present plant community—fourwing saltbush, winterfat, shadscale, galleta
• Important forage species—Indian ricegrass, fourwing saltbush, winterfat, galleta
Dominant vegetation on the Clayhole soil:
• Potential plant community—Indian ricegrass, galleta, gyp dropseed, shadscale
• Present plant community—galleta, Indian ricegrass, shadscale, gyp dropseed

Figure 5.—Areas of Jocity-Clayhole complex, 1 to 4 percent slopes. Water for livestock is derived from deep wells or water harvesting catchments.

• Important forage species—galleta, Indian ricegrass, fourwing saltbush

Major management factors: content of gypsum, gully erosion, flooding

General management considerations on the Jocity and Clayhole soils:

• Forage for livestock is limited by the high content of gypsum in the Clayhole part.

- Lack of seed source and competition from shrubby species for moisture make desirable grasses slow to recover on the Clayhole part.
- Clayhole soil has a relatively low productivity of forage plants.
- Grazing should be delayed until the Jocity part has dried out sufficiently to withstand trampling and compaction.
- Some areas of Jocity part have been converted to cropland and pasture (fig. 5).

Suitable management practices:
- Proper grazing use
- Planned grazing system
- Fencing
- Deferred grazing

Wildlife Habitat

Suitability of the Jocity soil for herbaceous plants and shrubs: moderately suited
Management consideration:
- Poor vegetative diversity.

Suitability for the Clayhole soil for herbaceous plants and shrubs: moderately suited
Management consideration:
- Competition between wildlife and cattle can be severe during all seasons.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
Range site: Jocity—Silty Upland 7-11" p.z.; Clayhole—Gypsum Upland 7-11" p.z.

20—Jocity silty clay loam, 1 to 4 percent slopes

Setting

Landform: stream terraces
Flooding: none
Elevation: 4,400 to 4,900 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Jocity soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

0 to 4 inches—reddish brown and yellowish red silty clay loam
4 to 11 inches—reddish brown clay
11 to 15 inches—yellowish red fine sandy loam
15 to 33 inches—reddish brown clay loam
33 to 60 inches—reddish brown fine sandy loam

Soil Properties and Qualities

Parent material: mixed alluvium
Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: slight with gullying potential
Hazard of wind erosion: moderate

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 4 percent.
- Soils that are sandy loam throughout.
- Soils that have a high content of gypsum on alluvial fans.
- Soils that are similar to Jocity but on flood plains that flood during prolonged high-intensity storms.
- Soils that are slightly saline.
- Areas that are gullied.

Similar inclusions:
- Soils that have a loam or sandy loam surface.
- Soils that are silty throughout.
- Soils averaging less than 18 percent clay in the profile.
- Soils without any structure.

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—galleta, winterfat, fourwing saltbush, Indian ricegrass
- Present plant community—fourwing saltbush, winterfat, shadscale, galleta

Important forage species: Indian ricegrass, fourwing saltbush, winterfat, galleta
Major management factors: gully erosion, moderately slow permeability, droughtiness
General management considerations:
- Planned grazing systems can be readily adopted on this site.
- Grazing should be delayed until the soil has dried out sufficiently to withstand trampling and compacting.
- Forage plants can be limited by the slow infiltration and droughtiness.

• Some areas of this soil have been converted to cropland and pasture.
Suitable management practices:
• Proper grazing use
• Planned grazing system
• Deferred grazing
• Fencing

Cropland

General management considerations:
• Low annual precipitation limits the crops that can be grown on this soil.
• Crops that tolerate drought are best suited. The moisture available is not adequate for good growth of other crops.
• Because of low precipitation, this soil is poorly suited to dryland farming.
• Irrigation is required for maximum production of crops.
This soil is suited to most irrigation systems.
• If sprinklers are used, apply water slowly to minimize runoff.
• Wind erosion can be reduced by maintaining plant cover, keeping mulch on the surface, keeping the surface of the soil rough and limiting the width of strips of unprotected soil.

Wildlife Habitat

Suitability for herbaceous plants and shrubs: poorly suited
Management consideration:
• Poor vegetative diversity.

Interpretive Groups

Land capability classification: IIe, irrigated; VIIs, nonirrigated
Range site: Silty Upland 7-11" p.z.

21—Jocity silty clay loam, 1 to 2 percent slopes, flooded

Setting

Landform: flood plains
*Flooding:*occasional for very brief periods
Elevation: 4,600 to 4,800 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Jocity soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

0 to 4 inches—brown silty clay loam
4 to 23 inches—brown silt loam
23 to 34 inches—brown loam
34 to 46 inches—brown silt loam
46 to 60 inches—brown loam

Soil Properties and Qualities

Parent material: alluvium from sandstone and shale
Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Available water capacity: very high
Potential rooting depth: 60 or more inches
Runoff: ponded or very slow
Hazard of water erosion: moderate
Hazard of wind erosion: moderate

Inclusions

Contrasting inclusions:
• Soils that are clayey throughout.
• Soils that are loamy sand throughout.
• Soils that have a high salinity.
• Soils that are similar to Jocity but on stream terraces that do not flood.
• Soils that flood for long periods of time.
• Soils that have gypsum in the profile.
Similar inclusions:
• Soils that have loam, silty clay loam, clay loam or sandy loam surfaces.
• Soils that are similar to Jocity but that are silt loam throughout.

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—alkali sacaton, winterfat, fourwing saltbush, galleta
• Present plant community—galleta, threeawn, ring muhly
• Important forage species: alkali sacaton, winterfat, fourwing saltbush, galleta
Major management factors: flash flooding, gully erosion, moderately slow permeability
General management considerations:
• Grazing should be delayed until the soil has sufficiently dried to prevent trampling and compaction.
• Grazing rotation systems should be used to avoid this soil during wet periods.
Suitable management practices:
• Proper grazing use
• Planned grazing systems

• Fencing
• Deferred grazing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited

Interpretive Groups

Land capability classification: VIIs, nonirrigated
Range site: Clay Loam Bottom 7-11" p.z.

22—Kinan gravelly loam, 1 to 15 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 4,700 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Kinan soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

Rock fragments on surface: 25 percent gravel
0 to 7 inches—brown gravelly loam
7 to 14 inches—yellowish red gravelly loam
14 to 28 inches—pink loam
28 to 44 inches—light reddish brown loam
44 to 51 inches—yellowish red channery loam
51 to 60 inches—reddish brown very channery sandy clay loam

Soil Properties and Qualities

Parent material: alluvium from limestone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: moderate
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: severe
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 15 percent.
• Soils that are similar to Kinan but that have more than 35 percent rock fragments.
• Soils that have a high content of gypsum.
• Soils that are shallow to limestone.
• Areas of cliffs.
Similar inclusions:
• Loamy soils but that have a higher clay content.

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—Indian ricegrass, needleandthread, blue grama, black grama
• Present plant community—needlegrasses, Indian ricegrass, blue grama, Mormon-tea
• Important forage species: black grama, blue grama, Indian ricegrass, fourwing saltbush
Major management factors: hazard of water erosion
General management considerations:
• Use brush management in areas where unpalatable species have increased significantly.
• Vigor of desirable forage plants should be maintained or improved to reduce erosion hazard.
• Overuse can occur because livestock prefer this site over other sites in adjacent areas.
Suitable management practices:
• Proper grazing use
• Fencing
• Deferred grazing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
• Open rangeland wildlife prefer this site.
• The Rock outcrop grows no vegetation but is important for nest sites, resting cover, hunting perches, escape and dens.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Loamy Upland 7-11" p.z.

23—Kinan-Hatknoll-Grieta complex, 1 to 5 percent slopes

Setting

Landform: fan terraces (fig. 6)
Landscape position: Hatknoll—lower concave positions; Kinan and Grieta—higher convex positions
Slope range: 1 to 5 percent
Flooding: none
Elevation: 4,700 to 5,000 feet
Mean annual precipitation: 6 to 10 inches

Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Kinan and similar soils: 50 percent
Hatknoll and similar soils: 25 percent
Grieta and similar soils: 15 percent
Contrasting inclusions: 10 percent

Typical Profile

Kinan

0 to 7 inches—brown loam
7 to 14 inches—yellowish red gravelly loam
14 to 28 inches—pink loam
28 to 44 inches—light reddish brown loam
44 to 51 inches—yellowish red channery loam
51 to 60 inches—reddish brown very channery sandy clay loam

Hatknoll

0 to 3 inches—dark brown silty clay loam
3 to 20 inches—dark brown silty clay
20 to 25 inches—reddish brown gravelly silty clay
25 to 60 inches—light brown loam

Grieta

0 to 3 inches—brown loam
3 to 21 inches—dark brown loam
21 to 25 inches—brown loam
25 to 36 inches—light brown loam
36 to 60 inches—light brown loam

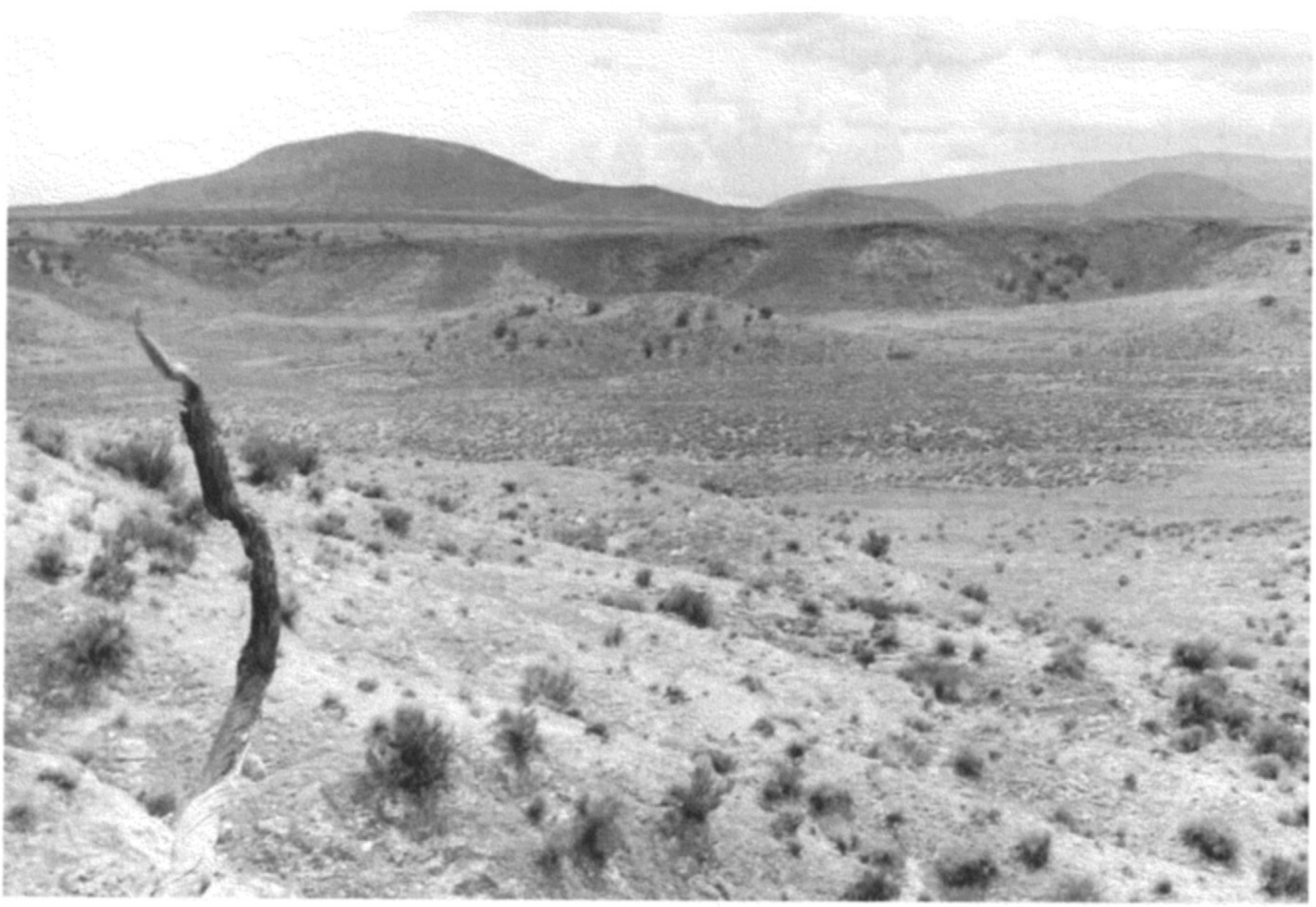

Figure 6.—Kinan-Hatknoll-Grieta complex, 1 to 5 percent slopes, is on the fan terraces between Gypsiorthids-Gypsiorthids, shallow complex, 1 to 50 percent slopes, in the foreground and Wutoma-Lozinta complex, 15 to 50 percent slopes, on the cinder cones in the background.

Soil Properties and Qualities

Kinan

Parent material: alluvium from limestone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: moderate
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight

Hatknoll

Parent material: alluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: slight
Hazard of wind erosion: slight
Shrink-swell potential: high

Grieta

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 5 percent.
• Soils that have more than 35 percent rock fragments.
Similar inclusions:
• Grieta soils that have a silty clay loam surface.
• Soils that have slopes of less than 1 percent.

Use and Management

Rangeland

Dominant vegetation on the Grieta and Kinan soils:
• Potential plant community—Indian ricegrass, needleandthread, blue grama, black grama
• Present plant community—blue grama, squirreltail, Indian ricegrass, galleta
• Important forage species—Indian ricegrass, black grama, blue grama, fourwing saltbush
Dominant vegetation on the Hatknoll soil:
• Potential plant community—galleta, Indian ricegrass, Mormon-tea, fourwing saltbush
• Present plant community—galleta, squirreltail, Indian ricegrass, rabbitbrush, Mormon-tea
• Important forage species—fourwing saltbush, squirreltail, winterfat
Major management factors: slow permeability (Hatknoll)
General management considerations on the Grieta and Kinan soils:
• Readily responds to proper management.
• Good livestock distribution is necessary to use the forage properly.
General management considerations on the Hatknoll soil:
• Vegetation is difficult to restore once the plant cover has been altered.
• Ground cover should be maintained or improved to reduce the hazard of erosion.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing

Wildlife Habitat

Suitability of the Kinan-Hatknoll-Grieta soils for herbaceous plants and shrubs: moderately suited
Management consideration:
• Open rangeland wildlife prefer this site.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
Range site: Kinan and Grieta—Loamy Upland 7-11" p.z.; Hatknoll—Clayey Upland 7-11" p.z.

24—Kinan-Pennell complex, 1 to 20 percent slopes

Setting

Landform: Kinan—fan terraces; Pennell—hills
Flooding: none
Slope range: Kinan—1 to 10 percent; Pennell—1 to 20 percent
Elevation: 4,700 to 5,100 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Kinan and similar soils: 55 percent
Pennell and similar soils: 35 percent
Contrasting inclusions: 10 percent

Typical Profile

Kinan

Rock fragments on the surface: 30 percent gravel
0 to 7 inches—brown gravelly loam
7 to 14 inches—yellowish red gravelly loam
14 to 28 inches—pink loam
28 to 44 inches—light reddish brown loam
44 to 51 inches—yellowish red channery loam
51 to 60 inches—reddish brown very channery sandy clay loam

Pennell

Rock fragments on the surface: 25 percent gravel
0 to 2 inches—brown gravelly loam
2 to 9 inches—brown sandy loam
9 to 12 inches—brown gravelly sandy loam
12 inches—limestone

Soil Properties and Qualities

Kinan

Parent material: alluvium from limestone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: moderate
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight

Pennell

Parent material: alluvium from limestone
Depth class: shallow
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium to rapid
Hazard of water erosion: very severe
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 20 percent.
- Soils on flood plains.
- Soils high in gypsum content.
- Areas of Rock outcrop.
- Soils that are moderately deep to bedrock.

Similar inclusions:
- Soils that are similar to Pennell but less than 10 inches to bedrock.

Use and Management

Rangeland

Dominant vegetation on the Kinan soil:
- Potential plant community—Indian ricegrass, needleandthread, blue grama, black grama
- Present plant community—blue grama, needlegrasses, squirreltail, threeawn
- Important forage species—Indian ricegrass, black grama, blue grama, fourwing saltbush

Dominant vegetation on the Pennell soil:
- Potential plant community—black grama, galleta, Indian ricegrass
- Present plant community—black grama, galleta, rabbitbrush, snakeweed
- Important forage species—galleta, Indian ricegrass, black grama

Major management factors: depth to bedrock and very low available water capacity (Pennell); hazard of water erosion

General management considerations on the Kinan and Pennell soils:
- Brush management and range seeding are limited because of shallow depth to bedrock and low water holding capacity on the Pennell part.
- Earthen water impoundments are limited because of shallow depth to bedrock on the Pennell part.
- Ground cover should be maintained or improved to reduce the hazard of erosion.
- Kinan part responds well to good management.
- Good livestock distribution is necessary to use the forage properly.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Deferred grazing

Wildlife Habitat

Suitability of the Kinan and Pennell soils for herbaceous plants and shrubs: moderately suited
Management consideration:
- Open rangeland wildlife prefer this site.

Interpretive Groups

Land capability classification: VIIe, nonirrigated

Range site: Kinan—Loamy Upland 7-11" p.z.; Pennell—Shallow Loamy 7-11" p.z.

25—Klondike sandy clay loam, 2 to 15 percent slopes

Setting

Landform: hills
Flooding: none
Elevation: 4,800 to 5,000 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Klondike soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 10 percent channers
0 to 2 inches—reddish brown sandy clay loam
2 to 8 inches—reddish brown clay loam
8 to 11 inches—reddish brown loam
11 inches—fractured sandstone

Soil Properties and Qualities

Parent material: alluvium from sandstone and shale
Depth class: shallow
Drainage class: well drained
Permeability: moderately slow
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium to rapid
Hazard of water erosion: very severe
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 15 percent.
- Soils that are moderately deep over sandstone.
- Soils that are deep and more than 35 percent rock fragments.
- Soils that are clayey.
- Areas of Rock outcrop.

Similar inclusions:
- Soils that have slopes of less than 2 percent.

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—black grama, blue grama, big sagebrush, needleandthread
- Present plant community—big sagebrush, blue grama, squirreltail
- Important forage species—black grama, blue grama, fourwing saltbush

Major management factors: depth to bedrock, very low available water capacity, hazard of water erosion
General management considerations:
- Range seeding is limited because of very low available water capacity.
- This soil is limited for earthen water impoundments because of shallow depth to bedrock.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
- Scattered pinyon-juniper trees add structural diversity to this open grassland.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Range site: Shallow Loamy 10-14" p.z.

26—Lava Flows

Lava flows are areas that are covered by lava. This flow has sharp jagged surfaces, crevices, and angular blocks characteristic of lava. A little soil material may be in a few cracks and sheltered pockets, but the flow is virtually devoid of plants except for lichens and a few oak trees.

These areas grow no vegetation but are used for dens, nests, and escape cover. Water may be found in potholes.

Interpretive Groups

Lava flows is not assigned a capability subclass or a range site.

27—Lozinta extremely gravelly loam, 1 to 15 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 135 to 150 days

Composition

Lozinta soil and similar soils: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Rock fragments on surface: 70 percent cinders
0 to 10 inches—dark brown extremely gravelly loam
10 to 24 inches—brown extremely gravelly loam
24 to 60 inches—black cinders

Soil Properties and Qualities

Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Depth class: very deep (moderately deep to cinders)
Drainage class: somewhat excessively drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: slight
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 15 percent.
- Areas of Wukoki soils.
- Soils that have less than 60 percent cinders in the profile.
- Soils deeper than 40 inches to cinders.

Use and Management

Grazeable Woodland

Dominant vegetation:
- Potential plant community—juniper, pinyon, blue grama, black grama
- Present plant community—juniper, pinyon, blue grama, snakeweed

Important forage species: blue grama, black grama, needleandthread, cliffrose
Major management factors: very low available water capacity
General management considerations:
- This unit responds moderately well to management.
- Production of fuelwood for this unit is 2-4 cords/acre.
- Water developments are generally lacking on this unit.

Suitable management practices:
- Proper woodland grazing
- Planned grazing system
- Fencing
- Deferred grazing
- Access roads

Wildlife Habitat

Suitability for coniferous trees: moderately suited
Management considerations:
- These woodlands of pinyon-juniper provide habitat for many species.
- Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Woodland site: Cinder Upland 14-18" p.z.

28—Lozinta extremely gravelly loam, 15 to 45 percent slopes

Setting

Landform: cinder cones
Flooding: none
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Lozinta soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

Rock fragments on surface: 65 percent cinders
0 to 10 inches—dark brown extremely gravelly loam
10 to 24 inches—brown extremely gravelly loam
24 to 60 inches—black cinders

Soil Properties and Qualities

Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Depth class: very deep (moderately deep to cinders)
Drainage class: somewhat excessively drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 60 or more inches
Runoff: rapid
Hazard of water erosion: severe
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:

- Soils that have slopes of more than 45 percent.
- Soils that are similar to Lozinta but that have a zone of lime accumulation.
- Soils deeper than 40 inches to cinders.
- Soils shallow to cinders.
- Soils that are similar to Lomaki but that have loam to about 15 inches.
- Soils that have a lime cemented hardpan above 20 inches.

Similar inclusions:
- Soils that have slopes of less than 15 percent.

Use and Management

Grazeable Woodland

Dominant vegetation:
- Potential plant community—juniper, pinyon, blue grama, snakeweed
- Present plant community—juniper, pinyon, black grama, blue grama

Important forage species: blue grama, black grama, needleandthread, cliffrose
Major management factors: very low available water capacity, slope, hazard of water erosion
General management considerations:
- Low productivity and steep slopes limit management alternatives.
- Steep slopes limit access by livestock and result in overgrazing of lesser sloping areas.
- Water developments are generally lacking on this unit.
- Production of fuelwood for this unit is 2-3 cords/acre.

Suitable management practices:
- Proper woodland grazing
- Fencing
- Access roads

Wildlife Habitat

Suitability for coniferous trees: moderately suited
Management considerations:
- These woodlands provide habitat for many species.
- Firewood gatherers should not disturb nest trees.
- Water is lacking.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Woodland site: Cinder Hills 14-18" p.z.

29—Manikan silty clay loam, 1 to 4 percent slopes

Setting

Landform: stream terraces
Flooding: none
Elevation: 4,900 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Querencia soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

0 to 4 inches—brown silty clay loam
4 to 23 inches—brown silt loam
23 to 34 inches—brown loam
34 to 46 inches—brown silt loam
46 to 60 inches—brown loam

Soil Properties and Qualities

Parent material: alluvium from sandstone and shale
Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Available water capacity: very high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: slight with gullying potential
Hazard of wind erosion: moderate

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 4 percent.
- Soils that are sandy loam throughout.
- Soils that have a high content of gypsum on alluvial fans.
- Soils that are similar to Querencia but on flood plains that flood during prolonged high intensity storms.
- Soils that are slightly saline.
- Areas that are gullied.

Similar inclusions:
- Soils that have loam or sandy loam surfaces.
- Soils that are silty throughout.
- Soils that have less than 18 percent clay.
- Soils that lack structure.

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—blue grama, black grama, western wheatgrass, bottlebrush squirreltail, big sagebrush
• Present plant community—bottlebrush squirreltail, galleta, fourwing saltbush, big saltbush
Important forage species: western wheatgrass, fourwing saltbush, blue grama, black grama
Major management factors: gully erosion
General management considerations:
• Seeding is difficult because of the shrinking and swelling of this soil.
• Seed only plants that tolerate shrinking and swelling.
• The vegetation on this soil is often difficult to restore once the plant cover has been altered.
• Grazing should be delayed until the soil has dried sufficiently to withstand trampling and compaction.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: poorly suited
Management consideration:
• Poor vegetative diversity.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Range site: Clayey Upland 10-14" p.z.

30—Mellenthin-Anasazi complex, 1 to 15 percent slopes

Setting

Landform: hills
Landscape position: Mellenthin—convex positions; Anasazi—toeslopes, footslopes and other concave slopes
Flooding: none
Slope range: Mellenthin—1 to 15 percent; Anasazi—1 to 10 percent
Elevation: 5,000 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Mellenthin and similar soils: 50 percent
Anasazi and similar soils: 40 percent
Contrasting inclusions: 10 percent

Typical Profile

Mellenthin

Rock fragments on the surface: 25 percent gravel
0 to 8 inches—brown gravelly fine sandy loam
8 to 15 inches—light brown very gravelly loam
15 inches—limestone

Anasazi

Rock fragments on the surface: 20 percent gravel
0 to 12 inches—brown gravelly loam
12 to 21 inches—light brown gravelly loam
21 to 23 inches—pink very gravelly loam
23 inches—limestone

Soil Properties and Qualities

Mellenthin

Parent material: alluvium from limestone
Depth class: shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Anasazi

Parent material: alluvium from limestone
Depth class: moderately deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: very low
Potential rooting depth: 20 to 40 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderate

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 15 percent
• Soils that are deep on fan terraces

Similar inclusions:
• Soils that have a loam or gravelly sandy loam surface

Use and Management

Rangeland

Dominant vegetation on the Mellenthin soil:
• Potential plant community—blue grama, needleandthread, big sagebrush
• Present plant community—big sagebrush, blue grama, galleta, rabbitbrush
Important forage species: black grama, blue grama, Indian ricegrass, galleta
Dominant vegetation on the Anasazi soil:
• Potential plant community—western wheatgrass, blue grama, big sagebrush, fourwing saltbush
• Present plant community—blue grama, big sagebrush, galleta, bottlebrush squirreltail
Important forage species: western wheatgrass, squirreltail, galleta, fourwing saltbush
Major management factors: depth to bedrock, very low available water capacity
General management considerations on the Mellenthin and Anasazi soils:
• Range seeding on the Mellenthin part is limited because of low available water capacity.
• Anasazi part responds to proper management.
• Overuse can occur because livestock prefer this site over others in adjacent areas.
• Good livestock distribution is necessary to properly utilize forage.
• Earthen water impoundments are limited on the Mellenthin part because of shallow depth to bedrock.
• Use brush management where unpalatable species have increased significantly on the Anasazi part.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing
• Brush management

Wildlife Habitat

Suitability of the Mellenthin and Anasazi soils for herbaceous plants and shrubs: moderately suited
Management considerations:
• Scattered pinyon-juniper trees on the Mellenthin soils add structural diversity.
• Open rangeland wildlife prefer the Anasazi soil.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Range site: Mellenthin—Shallow Loamy 10-14" p.z.; Anasazi—Loamy Upland 10-14" p.z.

31—Mellenthin-Barx complex, 1 to 15 percent slopes

Setting

Landform: Mellenthin—hills; Barx—fan terraces
Flooding: none
Slope range: Mellenthin—1 to 15 percent; Barx—1 to 8 percent
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Mellenthin and similar soils: 45 percent
Barx and similar soils: 35 percent
Contrasting inclusions: 20 percent

Typical Profile

Mellenthin

Rock fragments on the surface: 20 percent gravel
0 to 8 inches—brown gravelly loam
8 to 15 inches—light brown very gravelly loam
15 inches—limestone

Barx

Rock fragments on the surface: 20 percent gravel
0 to 2 inches—brown gravelly loam
2 to 5 inches—brown sandy clay loam
5 to 8 inches—reddish brown sandy clay loam
8 to 28 inches—yellowish red sandy clay loam
28 to 50 inches—pink and yellowish red sandy clay loam
50 to 60 inches—reddish brown sandy clay loam

Soil Properties and Qualities

Mellenthin

Parent material: alluvium from limestone
Depth class: shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of water erosion: severe
Hazard of wind erosion: moderate

Barx

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained

Permeability: moderate
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 15 percent
- Soils that are moderately deep to bedrock
- Soils that are clayey below the surface in the lowest concave areas
- Curhollow soils on some remnant ridges and short sideslopes
- Jocity soils on active stream terraces

Similar inclusions:
- Soils that have a sandy loam surface layer

Use and Management

Rangeland

Dominant vegetation on the Mellenthin soil:
- Potential plant community—black grama, needleandthread, galleta, big sagebrush
- Present plant community—big sagebrush, blue grama, galleta, needleandthread
- Important forage species—needleandthread, blue grama, black grama, squirreltail

Dominant vegetation on the Barx soil:
- Potential plant community—blue grama, western wheatgrass, galleta, big sagebrush
- Present plant community—big sagebrush, blue grama, bottlebrush squirreltail, algerita

Important forage species: western wheatgrass, galleta, blue grama, fourwing saltbush
Major management factors: depth to bedrock, available water capacity, hazard of water erosion (Mellenthin)
General management considerations on the Mellenthin and Barx soils:
- On the Mellenthin part grasses are very slow to recover because of the lack of a seed source and the competition from shrubby species for moisture.
- The Barx part responds well to management.
- The Barx part is preferred by livestock over other soils in the area because of accessibility and availability of water.
- Livestock grazing should be managed to maintain the desirable plant cover and protect the soil from excessive erosion.

Suitable management practices on the Mellenthin and Barx soils:
- Proper grazing use
- Planned grazing system
- Fencing
- Deferred grazing
- Brush management

Wildlife Habitat

Suitability of the Mellenthin soil for herbaceous plants and shrubs: moderately suited
Management consideration:
- Scattered pinyon-juniper trees add structural diversity to this open grassland.

Suitability of the Barx soil for herbaceous plants and shrubs: moderately suited
Management consideration:
- Open rangeland wildlife prefer this site.

Interpretive Groups

Land capability classification: Mellenthin—VIe, nonirrigated; Barx—VIs, nonirrigated
Range site: Mellenthin—Shallow Loamy 10-14" p.z.; Barx—Loamy Upland 10-14" p.z.

32—Mellenthin-Progresso complex, 1 to 7 percent slopes

Setting

Landform: Mellenthin—hills; Progresso—fan terraces
Landscape position: Mellenthin—upper convex position; Progresso—toeslopes, footslopes, concave areas
Flooding: none
Slope range: 1 to 7 percent
Elevation: 5,000 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Mellenthin and similar soils: 50 percent
Progresso and similar soils: 35 percent
Contrasting inclusions: 15 percent

Typical Profile

Mellenthin

Rock fragments on the surface: 20 percent gravel
0 to 8 inches—brown gravelly loam
8 to 15 inches—light brown very gravelly loam
15 inches—limestone

Progresso

0 to 4 inches—yellowish red sandy loam
4 to 27 inches—yellowish red sandy clay loam
27 inches—limestone

Soil Properties and Qualities

Mellenthin

Parent material: alluvium from limestone
Depth class: shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderate

Progresso

Parent material: alluvium from limestone
Depth class: moderately deep
Drainage class: well drained
Permeability: moderate
Available water capacity: low
Potential rooting depth: 20 to 40 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 7 percent.
- Areas of Rock outcrop.
- Deep soils on stream terraces and some toe slopes.
- Soils high in gypsum.

Similar inclusions:
- Soils that are similar to Progresso but without the clay increase in the subsoil.

Use and Management

Rangeland

Dominant vegetation on the Mellenthin soil:
- Potential plant community—black grama, blue grama, needleandthread, big sagebrush
- Present plant community—big sagebrush, blue grama, galleta, needlegrasses
- Important forage species—black grama, blue grama, galleta, western wheatgrass

Dominant vegetation on the Progresso soil:
- Potential plant community—blue grama, Indian ricegrass, fourwing saltbush, big sagebrush
- Present plant community—big sagebrush, blue grama, bottlebrush squirreltail

Important forage species: Indian ricegrass, blue grama, galleta, fourwing saltbush
Major management factors: low to very low available water capacity, depth to bedrock, hazard of wind erosion (Progresso)
General management considerations on the Mellenthin and Progresso soils:
- Range seeding on the Mellenthin part is limited because of low water holding capacity.
- Overuse can occur because livestock prefer this site over others in adjacent areas.
- Good livestock distribution is necessary to properly utilize forage.
- Earthen water impoundments are limited on the Mellenthin part because of shallow depth to bedrock.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Deferred grazing

Wildlife Habitat

Suitability of the Mellenthin and Progresso soils for herbaceous plants and shrubs: moderately suited
Management consideration:
- Scattered pinyon-juniper trees add structural diversity to this open grassland.

Interpretive Groups

Land capability classification: Progresso—VIe, nonirrigated; Mellenthin—VIs, nonirrigated
Range site: Mellenthin—Shallow Loamy 10-14" p.z.; Progresso—Sandy Loam Upland, Calcareous 10-14" p.z.

33—Mellenthin very gravelly loam, 1 to 25 percent slopes

Setting

Landform: hills
Flooding: none
Elevation: 4,800 to 5,100 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Mellenthin soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 60 percent gravel
0 to 8 inches—brown very gravelly loam
8 to 15 inches—light brown very gravelly loam
15 inches—limestone

Soil Properties and Qualities

Parent material: alluvium from limestone

Depth class: shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium to rapid
Hazard of water erosion: moderate to severe
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 25 percent
- Soils that are moderately deep on fan terraces
- Soils that are deep on fan terraces
- Soils that are high in gypsum

Similar inclusions:
- Soils that have more lime in the profile

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—Indian ricegrass, blue grama, needleandthread, big sagebrush
- Present plant community—sagebrush, blue grama, galleta, rabbitbrush

Important forage species: black grama, blue grama, galleta, Indian ricegrass
Major management factors: depth to bedrock, very low available water capacity, slope, hazard of water erosion
General management considerations:
- Range seeding is limited because of very low available water capacity.
- This soil is limited for earthen water impoundments because of shallow depth to bedrock.

Suitable management practices:
- Proper grazing use
- Fencing
- Deferred grazing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
- Scattered pinyon-juniper trees add structural diversity to this open grassland.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Range site: Shallow Loamy 10-14" p.z.

34—Mellenthin very gravelly loam, 30 to 50 percent slopes

Setting

Landform: hills
Flooding: none
Elevation: 5,000 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Mellenthin soil and similar soils: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Rock fragments on surface: 50 percent gravel
0 to 8 inches—brown very gravelly loam
8 to 15 inches—light brown very gravelly loam
15 inches—limestone

Soil Properties and Qualities

Parent material: alluvium from limestone
Depth class: shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: very rapid
Hazard of water erosion: very severe
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 50 percent.
- Soils that are moderately deep and deep on toe slopes, stream terraces, and flood plains.
- Areas of Rock outcrop.

Similar inclusions:
- Soils that have slopes of less than 30 percent.

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—prairie junegrass, blue grama, galleta, big sagebrush
- Present plant community—big sagebrush, blue grama, squirreltail, Mormon-tea

Important forage species: prairie junegrass, blue grama, fourwing saltbush, galleta
Major management factors: depth to bedrock, very low available water capacity, hazard of water erosion, slope
General management considerations:
• Grazing should be managed to prevent overuse and subsequent deterioration of the vegetation.
• Lack of a seed source and competition from shrubby species for moisture make desirable grasses slow to recover.
• Mellenthin part responds less readily to management than other soils in the area.
• Slope limits access for livestock grazing and results in overgrazing of the less sloping areas.
• Livestock will avoid this unit unless their movement is restricted by fences.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
• Scattered pinyon-juniper trees add structural diversity to this open grassland.
• Steep slopes and broken topography provide safety from danger.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Limestone Breaks 10-14" p.z.

35—Mellenthin very gravelly loam, cool, 1 to 25 percent slopes

Setting

Landform: hills
Flooding: none
Elevation: 5,000 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Mellenthin soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 40 percent gravel
0 to 8 inches—brown very gravelly loam
8 to 15 inches—light brown very gravelly loam
15 inches—limestone

Soil Properties and Qualities

Parent material: alluvium from limestone
Depth class: shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium to rapid
Hazard of water erosion: moderate to severe
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 25 percent
• Soils that are moderately deep on fan terraces
• Soils that are deep on stream terraces and fan terraces
• Soils that are high in gypsum
Similar inclusions:
• Soils that have high content of lime

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—black grama, blue grama, needleandthread, big sagebrush
• Present plant community—big sagebrush, blue grama, galleta, rabbitbrush
Important forage species: black grama, blue grama, galleta, Indian ricegrass
Major management factors: very low available water capacity, depth to bedrock, hazard of water erosion
General management considerations:
• Range seeding is limited because of low available water capacity.
• Earthen water impoundments are limited because of shallow depth to bedrock.
Suitable management practices:
• Proper grazing use
• Fencing
• Deferred grazing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
• Scattered pinyon-juniper trees add structural diversity to this open grassland.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Range site: Shallow Loamy 10-14" p.z.

36—Mellenthin very gravelly loam, warm, 1 to 25 percent slopes

Setting

Landform: hills
Flooding: none
Elevation: 4,400 to 5,100 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Mellenthin soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

Rock fragments on surface: 60 percent gravel
0 to 8 inches—brown very gravelly loam
8 to 15 inches—light brown very gravelly loam
15 inches—limestone

Soil Properties and Qualities

Parent material: alluvium from limestone
Depth class: shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium to rapid
Hazard of water erosion: moderate to severe
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 25 percent
- Soils that are moderately deep and deep on fan terraces

Similar inclusions:
- Soils that are more limy

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—blackbrush, black grama, Mormon-tea, Mexican cliffrose
- Present plant community—blackbrush, blue yucca, Mormon-tea, cholla

Important forage species: Indian ricegrass, black grama, cliffrose, Mormon-tea
Major management factors: depth to bedrock, very low available water capacity, hazard of water erosion
General management considerations:
- Earthen water impoundments are limited because of shallow depth to bedrock.
- Low productivity and slow range recovery require special management considerations.

Suitable management practices:
- Proper grazing use
- Deferred grazing
- Fencing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited

Interpretive Groups

Land capability classification: VIe, nonirrigated
Range site: Shallow Upland 10-14" p.z.

37—Mido fine sand, 1 to 10 percent slopes

Setting

Landform: fan terraces
Landscape position: dunes, 1 to 12 feet high
Flooding: none
Elevation: 4,900 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Mido soil and similar soils: 95 percent
Contrasting inclusions: 5 percent

Typical Profile

0 to 2 inches—reddish yellow fine sand
2 to 33 inches—strong brown fine sand
33 to 46 inches—reddish yellow very fine sand
46 to 60 inches—reddish yellow fine sand

Soil Properties and Qualities

Parent material: alluvium and eolian material from sandstone
Depth class: very deep
Drainage class: excessively drained
Permeability: rapid
Available water capacity: low
Potential rooting depth: 60 or more inches
Runoff: very slow to slow
Hazard of water erosion: moderate

Hazard of wind erosion: very high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 12 percent
- Soils that have fine sandy loam subsurfaces
- Soils that have loam or silt loam subsurfaces
- Soils that have a high content of gypsum
- Soils that have numerous textural changes in the profile
- Areas of active dunes

Similar inclusions:
- Soils that have continuous thin strata of loam or silt loam
- Soils that are similar to Mido but that have bedrock beginning at 40 to 60 inches

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—Indian ricegrass, sand sagebrush, sand dropseed, fourwing saltbush
- Present plant community—Indian ricegrass, sand sagebrush, sand dropseed, spike dropseed

Important forage species: Indian ricegrass, galleta, sand dropseed, fourwing saltbush
Major management factors: hazard of wind erosion, low available water capacity, seepage
General management considerations:
- Good cover of vegetation should be maintained to prevent wind erosion.
- Water developments are limited because of seepage potential.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing

Cropland

General management considerations:
- Because of the limited precipitation and limited available water capacity, most crops have to be irrigated.
- Yields—alfalfa, 3 tons; barley, 3,500 pounds; wheat, 2,000 pounds; pasture, 10-12 AUMs.

Suitable management practices:
- Because the water intake rate is rapid, the most suitable irrigation systems are sprinkle and trickle.
- Because the soil is droughty, light and frequent irrigations are essential. More efficient use of fertilizer can be obtained through light frequent applications.
- Wind erosion can be reduced by maintaining plant cover, keeping mulch on the surface, keeping the surface of the soil rough, and limiting the width of strips of unprotected soil.

Building Site Development

General management considerations:
- This soil is highly susceptible to wind erosion.
- Excavation increases the risk of wind and water erosion.
- Cutbanks are not stable and therefore are subject to slumping.
- The quality of roadbeds can be adversely affected by limiting soil strength.

Suitable management practices:
- Revegetate disturbed areas at construction sites as soon as possible to reduce the risk of wind erosion.
- Reduce the risk of erosion and maintenance cost by stabilizing areas that have been disturbed.
- Preserve the existing plant cover during construction to reduce the risk of erosion.
- To minimize subsidence, use the fill as a base for structures only after the material has been compacted.
- Construct special retainer walls in shallow excavations to prevent cutbanks from caving in.
- Consider the depth to which frost penetrates in designing footing and road bases.
- Offset the risk of corrosion to uncoated steel by using corrosion-resistant material or by using coating and cathodic protectors.
- Provide a stable base and an adequate wearing surface to improve road trafficability.
- Install culverts to carry seasonal runoff where roads cross natural drainageways.
- Design roads to control surface runoff and keep soil loss at a minimum.
- Stabilize disturbed areas to reduce the risk of erosion and maintenance costs resulting from erosion.
- Seed road cuts and fills to permanent vegetation.

Landscaping

Suitable management practices:
- Preserve as many trees as possible.
- Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping of slopes.
- Either select plants that tolerate droughtiness or provide irrigation.

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:

• Burrowing animals find this site suitable for digging.

Interpretive Groups

Land capability classification: IVe, irrigated; VIIe, nonirrigated
Range site: Sandy Upland 10-14" p.z.

38—Mido loamy fine sand, 1 to 4 percent slopes, gullied

Setting

Landform: stream terraces
Flooding: none
Elevation: 4,900 to 5,300 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Mido soil and similar soils: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

0 to 2 inches—reddish yellow loamy fine sand
2 to 33 inches—strong brown fine sand
33 to 46 inches—reddish yellow very fine sand
46 to 60 inches—reddish yellow fine sand

Soil Properties and Qualities

Parent material: alluvium and eolian material from sandstone
Depth class: very deep
Drainage class: excessively drained
Permeability: rapid
Available water capacity: low
Potential rooting depth: 60 or more inches
Runoff: very slow
Hazard of water erosion: moderate
Hazard of wind erosion: high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 5 percent
• Soils that are sandy loam throughout, on alluvial fans
• Soils that are moderately deep to bedrock
• Soils on flood plains
• Areas of active dunes
Similar inclusions:
• Soils that have sandy loam surfaces
• Soils that have loam or clay loam surfaces

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—Indian ricegrass, needleandthread, galleta, sand sagebrush
• Present plant community—sand sagebrush, Indian ricegrass, sand dropseed
Important forage species: Indian ricegrass, galleta, blue grama, sand dropseed
Major management factors: gully erosion, low available water capacity, hazard of wind erosion, seepage
General management considerations:
• A good cover of vegetation must be maintained to prevent wind erosion.
• Water developments are limited because of seepage potential.
• Areas where brush management has been done are subject to a greater hazard of wind and water erosion.
• This unit responds well to good management.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing

Building Site Development

General management considerations:
• This soil is highly susceptible to wind erosion.
• Excavation increases the risk of wind and water erosion.
• Cutbanks are not stable and therefore are subject to slumping.
• The quality of roadbeds can be adversely affected by limited soil strength.
• The possibility of headward erosion must be considered.
Suitable management practices:
• Revegetate disturbed areas at construction sites as soon as possible to reduce the risk of wind erosion.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• Construct special retainer walls in shallow excavations to prevent cutbanks from caving in.
• Consider the depth to which frost penetrates in designing footings and road bases.
• Offset the risk of corrosion to uncoated steel by using corrosion-resistant material or by using coatings and cathodic protectors.
• Provide a stable base and an adequate wearing surface to improve road trafficability.

• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Design roads to control surface runoff and stabilize cut slopes.
• Provide drains to control surface runoff and keep soil loss at a minimum.
• Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
• Seed road cuts and fills to permanent vegetation.

Landscaping

Suitable management practices:
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping of slopes.
• Either select plants that tolerate droughtiness or provide irrigation.

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
• Water is lacking.
• Vegetation diversity is good.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Sandy Upland 10-14" p.z.

39—Milok gravelly loam, 1 to 15 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 5,000 to 5,600 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Milok soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

Rock fragments on surface: 20 percent gravel
0 to 3 inches—brown gravelly loam
3 to 11 inches—brown loam
11 to 30 inches—light brown sandy loam
30 to 60 inches—reddish brown gravelly sandy loam

Soil Properties and Qualities

Parent material: alluvium from limestone
Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: moderate
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: severe
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 15 percent.
• Soils that have high content of lime.
• Soils that are moderately deep to sand and gravel.
• Areas of Mellenthin soils.
• Soils that have more than 35 percent rock fragments.

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—western wheatgrass, blue grama, Indian ricegrass, big sagebrush
• Present plant community—blue grama, Indian rice grass, galleta, big sagebrush
Important forage species: western wheatgrass, blue grama, Indian ricegrass, fourwing saltbush
Major management factors: hazard of water erosion
General management considerations:
• Overuse can occur because livestock prefer this site over other sites in adjacent areas.
• Readily responds to proper management.
• Use brush management in areas where unpalatable species have increased significantly.
• Use planned grazing systems to obtain better livestock distribution.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing
• Brush management

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
• Open rangeland wildlife prefer this site.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Range site: Loamy Upland 10-14" p.z.

40—Moab loam, 1 to 5 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Moab soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 5 percent gravel
0 to 2 inches—brown loam
2 to 11 inches—brown very gravelly loam
11 to 24 inches—pinkish white very gravelly loam
24 to 38 inches—pinkish gray very gravelly loam
38 to 60 inches—brown very gravelly loam

Soil Properties and Qualities

Parent material: alluvium from limestone
Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: low
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 5 percent
- Soils that have less than 35 percent rock fragments
- Soils that have a clay increase in the subsoil
- Soils that have low content of lime
- Soils that are shallow
- Areas of Rock outcrop

Similar inclusions:
- Soils that have a gravelly loam surface texture

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—blue grama, western wheatgrass, galleta, big sagebrush
- Present plant community—big sagebrush, blue grama, western wheatgrass

Important forage species: western wheatgrass, blue grama, galleta, fourwing saltbush
Major management factors: hazard of water erosion, low available water capacity
General management considerations:
- Livestock grazing should be managed to protect the soil from excessive erosion.
- Livestock prefer this soil to others in the area because of accessibility and the availability of water. This results in overgrazing and subsequent deterioration of the vegetation.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Deferred grazing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
- Open rangeland wildlife prefer this site.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Range site: Loamy Upland 10-14" p.z.

41—Moab-Mellenthin complex, 1 to 20 percent slopes

Setting

Landform: Moab-fan terraces; Mellenthin-hills
Flooding: none
Slope range: 1 to 20 percent
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Moab and similar soils: 50 percent
Mellenthin and similar soils: 30 percent
Contrasting inclusions: 20 percent

Typical Profile

Moab

Rock fragments on surface—20 percent gravel

0 to 2 inches—brown gravelly loam
2 to 11 inches—brown very gravelly loam
11 to 24 inches—pinkish white very gravelly loam
24 to 38 inches—pinkish gray very gravelly loam
38 to 60 inches—brown very gravelly loam

Mellenthin

Rock fragments on surface—60 percent gravel
0 to 8 inches—brown very gravelly loam
8 to 15 inches—light brown very gravelly loam
15 inches—limestone

Soil Properties and Qualities

Moab

Parent material: alluvium from limestone
Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: low
Potential rooting depth: 60 or more inches
Runoff: medium to rapid
Hazard of water erosion: very severe
Hazard of wind erosion: slight

Mellenthin

Parent material: alluvium from limestone
Depth class: shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium to rapid
Hazard of water erosion: moderate to severe
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 20 percent
- Areas of Rock outcrop
- Areas that are very stony
- Soils that are moderately deep to bedrock
- Soils that have a high content of gypsum

Similar inclusions:
- Soils that are similar to Moab but that have a lower content of lime

Use and Management

Rangeland

Dominant vegetation on the Moab soil:
- Potential plant community—western wheatgrass, blue grama, galleta, big sagebrush
- Present plant community—big sagebrush, blue grama, squirreltail, Mormon-tea

Important forage species: western wheatgrass, blue grama, fourwing saltbush
Dominant vegetation on the Mellenthin soil:
- Potential plant community—needlegrasses, black grama, big sagebrush, winterfat
- Present plant community—galleta, big sagebrush, winterfat

Important forage species: black grama, western wheatgrass, squirreltail, winterfat
Major management factors: very low available water capacity, depth to bedrock (Mellenthin); low available water capacity (Moab), hazard of water erosion
General management considerations on the Moab and Mellenthin soils:
- The Moab part is preferred by livestock because of accessibility and availability of water.
- Grazing should be managed to prevent overuse and subsequent deterioration of the vegetation.
- On the Mellenthin part a lack of seed source and the competition from shrubby species for moisture make desirable grasses slow to recover.
- Seeding on the Mellenthin part is not practical because of low productivity potential.
- Mellenthin part responds less readily to management than other soils in the area.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Deferred grazing

Wildlife Habitat

Suitability of the Moab and Mellenthin soils for herbaceous plants and shrubs: moderately suited
Management considerations:
- Open rangeland wildlife prefer the Moab soils.
- Scattered pinyon-juniper trees on the Mellenthin soils add structural diversity.
- The Rock outcrop grows no vegetation but is important for nest sites, resting cover, hunting perches, escape, and dens.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Range site: Moab soil—Loamy Upland 10-14" p.z.; Mellenthin soil—Shallow Loamy 10-14" p.z.

42—Monue fine sandy loam, 1 to 5 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 4,700 to 4,900 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Monue soil and similar soils: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

0 to 5 inches—yellowish red fine sandy loam
5 to 40 inches—red fine sandy loam
40 to 46 inches—red silty clay loam
46 to 56 inches—red loam
56 to 60 inches—red fine sandy loam

Soil Properties and Qualities

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
• Soils that are loamy fine sand throughout
• Soils that are similar to Monue but on alluvial fans subject to sheet flooding
Similar inclusions:
• Soils that have massive or platy structure
• Soils that have more than 18 percent clay in the profile
• Soils that have a loam or silty clay loam surface

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—Indian ricegrass, needleandthread, blue grama, black grama, fourwing saltbush
• Present plant community—squirreltail, needlegrasses, blue grama, Mormon-tea
Important forage species: Indian ricegrass, blue grama, black grama, fourwing saltbush
Major management factors: hazard of wind erosion
General management considerations:
• Ground cover should be maintained or improved to reduce hazard of erosion.
• This unit responds well to good management when compared to other soils in the area.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Deferred grazing
• Fencing
• Water developments

Building Site Development

General management considerations:
• Excavation increases the risk of water erosion.
Suitable management practices:
• Revegetate disturbed areas at construction sites as soon as possible to reduce the risk of wind erosion.
• Reduce the risk of erosion and maintenance cost by stabilizing areas that have been disturbed.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• To minimize subsidence, use the fill as a base for structures only after the material has been compacted.
• Consider the depth to which frost penetrates in designing footings and road bases.
• Offset the risk of corrosion to uncoated steel by using corrosion-resistant material or by using coatings and cathodic protectors.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Design roads to control surface runoff and stabilize cut slopes.
• Provide drains to control surface runoff and keep soil loss at a minimum.
• Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
• Seed road cuts and fills to permanent vegetation.

Landscaping

Suitable management practices:
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping of slopes.
• Either select plants that tolerate droughtiness or provide irrigation.

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Sandy Loam Upland, Calcareous 7-11" p.z.

43—Padilla-Penistaja-Campanile complex, 1 to 6 percent slopes

Setting

Landform: Padilla and Penistaja—fan terraces; Campanile—mesas and hills
Landscape position: Padilla—concave positions; Penistaja—convex positions; Campanile—generally convex positions
Flooding: none
Slope range: Padilla and Penistaja—1 to 3 percent; Campanile—1 to 6 percent
Elevation: 4,800 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Padilla and similar soils: 50 percent
Penistaja and similar soils: 30 percent
Campanile and similar soils: 15 percent
Contrasting inclusions: 5 percent

Typical Profile

Padilla

0 to 2 inches—dark reddish brown clay
2 to 60 inches—reddish brown clay

Penistaja

0 to 5 inches—brown fine sandy loam
5 to 19 inches—red sandy clay loam
19 to 42 inches—yellowish red fine sandy loam
42 to 60 inches—red silty clay loam

Campanile

0 to 60 inches—reddish brown clay

Soil Properties and Qualities

Padilla

Parent material: alluvium from shale
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: slight
Hazard of wind erosion: moderate
Shrink-swell potential: high

Penistaja

Parent material: alluvium from shale and sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: slight
Hazard of wind erosion: moderately high

Campanile

Parent material: alluvium from shale
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderate
Shrink-swell potential: high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 6 percent
- Soils that are moderately deep to weathered bedrock

Similar inclusions:
- Soils that have a high content of lime
- Soils that have a yellower hue

Use and Management

Rangeland

Dominant vegetation on the Padilla and Campanile soils:
- Potential plant community—blue grama, black grama, galleta, big sagebrush
- Present plant community—blue grama, bottlebrush squirreltail, galleta

Important forage species: big sagebrush, blue grama, black grama, galleta, squirreltail, fourwing saltbush
Dominant vegetation on the Penistaja soil:
- Potential plant community—Indian ricegrass, needleandthread, blue grama, Mormon-tea
- Present plant community—blue grama, needleandthread, Indian ricegrass, big sagebrush

Important forage species: blue grama, black grama, Indian ricegrass, Mormon-tea
Major management factors: slow permeability, shrink swell (Padilla); hazard of wind erosion (Penistaja)
General management considerations on the Padilla, Penistaja, and Campanile soils:
• The Penistaja part responds well to good management.
• Ground cover should be maintained or improved to prevent erosion hazard.
• Range seeding on the Campanile and Padilla parts is limited to plants that are tolerant of shrinking and swelling.
• Cool season species benefit from deferred grazing.
• Grazing on the Campanile and Padilla parts should be delayed until the soil has dried sufficiently to withstand trampling and compaction.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing

Wildlife Habitat

Suitability of the Padilla and Campanile soils for herbaceous plants and shrubs: well suited
Management considerations:
• The plant diversity attracts many wildlife species.
Suitability for the Penistaja soil for herbaceous plants and shrubs: moderately suited

Interpretive Groups

Land capability classification: VIs, nonirrigated
Range site: Padilla—Clayey Upland 10-14" p.z.; Penistaja—Sandy Loam Upland, Calcareous 10-14" p.z.; Campanile—Clayey Upland 10-14" p.z.

44—Palma loamy fine sand, 1 to 5 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 4,800 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Palma soil and similar soils: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

0 to 8 inches—brown loamy fine sand
8 to 60 inches—yellowish red fine sandy loam

Soil Properties and Qualities

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: somewhat excessively drained
Permeability: moderately rapid
Available water capacity: moderate
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 5 percent
• Areas of Barx loamy fine sand and Barx fine sandy loam
• Areas of Mido loamy fine sand

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—Indian ricegrass, needleandthread, blue grama, galleta
• Present plant community—galleta, snakeweed, sand dropseed, blue grama
Important forage species: Indian ricegrass, galleta, blue grama, fourwing saltbush
Major management factors: hazard of wind erosion
General management considerations:
• This soil responds more readily to proper management than most other soils in the survey area.
• Livestock grazing should be managed to protect the soil from excessive erosion.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing

Cropland

General management considerations:
• Low annual precipitation limits the crops that can be grown on this soil.
• Irrigation is required for maximum production of crops.
• Wind erosion can be reduced by maintaining plant cover, keeping mulch on the surface, keeping the surface of the soil rough, and limiting the width of strips of unprotected soil.

• Crops that tolerate drought are best suited. The moisture available is not adequate for good growth of other crops.
• Yields—alfalfa, 4 tons; barley, 4,500 pounds; wheat, 3,000 pounds; pasture, 12-15 AUMs.
Suitable management practices:
• Suitable irrigation systems are sprinkler and trickle.

Building Site Development

General management considerations:
• This soil is highly susceptible to wind erosion.
• Excavation increases the risk of wind and water erosion.
• Cutbanks are not stable and therefore are subject to slumping.
• The quality of roadbeds can be adversely affected by limited soil strength.
Suitable management practices:
• Revegetate disturbed areas at construction sites as soon as possible to reduce the risk of wind erosion.
• Reduce the risk of erosion and maintenance cost by stabilizing areas that have been disturbed.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• To minimize subsidence, use the fill as a base for structures only after the material has been compacted.
• Construct special retainer walls in shallow excavations to prevent cutbanks from caving in.
• Consider the depth to which frost penetrates in designing footings and road bases.
• Offset the risk of corrosion to uncoated steel by using corrosion-resistant material or by using coatings and cathodic protectors.
• Provide a stable base and an adequate wearing surface to improve road trafficability.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Provide drains to control surface runoff and keep soil loss at a minimum.
• Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
• Seed road cuts and fills to permanent vegetation.

Landscaping

General management considerations:
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping of slopes.
• Either select plants that tolerate droughtiness or provide irrigation.

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
• Burrowing animals find this site suitable for digging.

Interpretive Groups

Land capability classification: IIIe, irrigated; VIIe, nonirrigated
Range site: Sandy Loam Upland, Calcareous 10-14" p.z.

45—Penistaja fine sandy loam, 1 to 5 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 4,800 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Penistaja soil and similar soils: 95 percent
Contrasting inclusions: 5 percent

Typical Profile

0 to 5 inches—brown fine sandy loam
5 to 19 inches—red sandy clay loam
19 to 42 inches—yellowish red fine sandy loam
42 to 60 inches—red silty clay loam

Soil Properties and Qualities

Parent material: alluvium from shale and sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 5 percent
• Areas of Padilla soils
• Areas of Mido soils
• Areas of Begay sandy loam, 10 to 30 percent slopes

Similar inclusions:
• Penistaja soils that have loamy sand surfaces

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—Indian ricegrass, needleandthread, blue grama, Mormon-tea
• Present plant community—blue grama, needleandthread, Indian ricegrass, big sagebrush
Important forage species: blue grama, black grama, Indian ricegrass, Mormon-tea
Major management factors: hazard of wind erosion
General management considerations:
• This unit responds well to proper management.
• Ground cover should be maintained or improved to prevent erosion hazard.
• Cool season species benefit from deferred grazing.
• Overuse can occur because livestock prefer this site over sites in the adjacent area.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited

Interpretive Groups

Land capability classification: VIe, nonirrigated
Range site: Sandy Loam Upland, Calcareous 10-14" p.z.

46—Pennell-Bacobi complex, 1 to 7 percent slopes

Setting

Landform: Pennell—hills; Bacobi—fan terraces
Flooding: none
Slope range: 1 to 7 percent
Elevation: 4,700 to 5,100 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Pennell and similar soils: 50 percent
Bacobi and similar soils: 35 percent
Contrasting inclusions: 15 percent

Typical Profile

Pennell

Rock fragments on the surface: 25 percent gravel
0 to 2 inches—brown gravelly sandy loam
2 to 9 inches—brown sandy loam
9 to 12 inches—brown gravelly sandy loam
12 inches—limestone

Bacobi

0 to 2 inches—yellowish red sandy loam
2 to 8 inches—reddish brown sandy clay loam
8 to 13 inches—reddish brown sandy clay loam
13 to 28 inches—yellowish red and light reddish brown sandy clay loam
28 to 32 inches—light reddish brown sandy loam
32 inches—fractured sandstone

Soil Properties and Qualities

Pennell

Parent material: alluvium from limestone
Depth class: shallow
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight

Bacobi

Parent material: alluvium from limestone
Depth class: moderately deep
Drainage class: well drained
Permeability: moderately slow
Available water capacity: low
Potential rooting depth: 20 to 40 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 7 percent
• Soils that are moderately deep that have a sandy loam profile
• Soils that are deep on toe slopes and stream terraces
Similar inclusions:
• Soils that are similar to Pennell but without the zone of lime accumulation
• Soils that are similar to Bacobi but without the zone of lime accumulation

• Soils that are similar to Bacobi but that have a redder hue

Use and Management

Rangeland

Dominant vegetation on the Pennell soil:
• Potential plant community—Indian ricegrass, galleta, black grama
• Present plant community—galleta, black grama, sand dropseed
Important forage species: Indian ricegrass, black grama, galleta
Dominant vegetation on the Bacobi soil:
• Potential plant community—blue grama, Indian ricegrass, black grama, needleandthread
• Present plant community—blue grama, squirreltail, threeawn, galleta
Important forage species: Indian ricegrass, black grama, fourwing saltbush
Major management factors: depth to bedrock (Pennell), hazard of wind erosion, very low and low available water capacity
General management considerations on the Pennell and Bacobi soils:
• Brush management and seeding is limited by the shallow depth to bedrock and very low available water capacity.
• Pennell responds less to management than other soils in the area.
• Production of vegetation suitable for livestock on the Bacobi part is limited by lime.
• Water impoundments are limited by shallow depth to bedrock.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing

Wildlife Habitat

Suitability of the Pennell and Bacobi soils for herbaceous plants and shrubs: moderately suited
Management considerations:
• Scattered pinyon-juniper trees on the Pennell soils add structural diversity.
• Open rangeland wildlife prefer the Bacobi soils.

Interpretive Groups

Land capability classification: Pennell—VIIs, nonirrigated; Bacobi—VIIs, nonirrigated
Range site: Pennell—Shallow Loamy 7-11" p.z.; Bacobi—Loamy Upland 7-11" p.z.

47—Pennell gravelly loam, 1 to 12 percent slopes

Setting

Landform: mesas and hills
Flooding: none
Elevation: 4,700 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Pennell soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 25 percent gravel
0 to 2 inches—brown gravelly loam
2 to 9 inches—brown sandy loam
9 to 12 inches—brown gravelly sandy loam
12 inches—limestone

Soil Properties and Qualities

Parent material: alluvium from limestone and sandstone
Depth class: shallow
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium to rapid
Hazard of water erosion: severe
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 12 percent
• Escarpments, 10 to 75 feet high
• Rock outcrop
• Soils that are moderately deep and deep on fan terraces
• Soils that are shallow to weathered bedrock
• Areas of Clayhole soils
• Areas of Jocity soils
• Soils high in gypsum
Similar inclusions:
• Soils that have a fine sandy loam surface

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—black grama, Indian ricegrass, galleta, sand dropseed

• Present plant community—black grama, galleta, sand dropseed
Important forage species: galleta, Indian ricegrass, black grama, fourwing saltbush
Major management factors: depth to bedrock, very low available water capacity, hazard of water erosion
General management considerations:
• Brush management and range seeding are limited by the shallow depth to bedrock and very low available water capacity.
• This soil is limited for earthen water impoundments because of shallow depth to bedrock.
Suitable management practices:
• Proper grazing use
• Fencing
• Planned grazing systems

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
• Scattered pinyon-juniper trees add structural diversity to this open grassland.
• The Rock outcrop grows no vegetation but is important for nest sites, resting cover, hunting perches, escape, and dens.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
Range site: Shallow Loamy 7-11" p.z.

48—Poley cobbly silty clay loam, 1 to 5 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Poley soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 10 percent cobble, 10 percent gravel
0 to 2 inches—dark brown cobbly silty clay loam
2 to 4 inches—dark brown silty clay loam
4 to 11 inches—dark brown silty clay
11 to 18 inches—light brown and pink silty clay and silty clay loam
18 to 27 inches—pink silt loam
27 to 36 inches—pink and brown silty clay loam
36 to 49 inches—reddish brown and pink gravelly clay loam
49 to 60 inches—reddish brown extremely cobbly loam

Soil Properties and Qualities

Parent material: alluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: very slight
Shrink-swell potential: high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 5 percent
• Areas of Curhollow gravelly loam
• Areas of Prieta gravelly loam
• Areas that have greater than 35 percent cobble and greater than 5 percent slopes
• Areas of Rubbleland
• Soils that are similar to Thimble but moderately deep to basalt

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—blue grama, western wheatgrass, winterfat, galleta
• Present plant community—galleta, blue grama, snakeweed, threeawn
Important forage species: western wheatgrass, blue grama, winterfat, galleta
Major management factors: slow permeability, shrink-swell
General management considerations:
• Production of vegetation for livestock grazing is limited by slow infiltration and shrink-swell potential.
• Seeding is limited because of frost heaving of seedlings.
• Grazing should be delayed until the soil has dried out sufficiently and is firm enough to withstand trampling and compacting by livestock.
Suitable management practices:
• Proper grazing use

- Planned grazing system
- Fencing
- Deferred grazing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
- Competition between wildlife and cattle can be severe during all seasons.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Range site: Clay Loam Upland 10-14" p.z.

49—Poley-Moab complex, 1 to 10 percent slopes

Setting

Landform: fan terraces
Flooding: none
Slope range: Poley—1 to 5 percent; Moab—1 to 10 percent
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Poley and similar soils: 40 percent
Moab and similar soils: 40 percent
Contrasting inclusions: 20 percent

Typical Profile

Poley

Rock fragments on the surface: 30 percent cobble, 20 percent gravel
0 to 2 inches—dark brown very cobbly silt loam
2 to 4 inches—dark brown silty clay loam
4 to 11 inches—dark brown silty clay
11 to 18 inches—light brown and pink silty clay and silty clay loam
18 to 27 inches—pink silt loam
27 to 36 inches—pink and reddish brown silty clay loam
36 to 49 inches—reddish brown and pink clay loam
49 to 60 inches—reddish brown extremely cobbly loam

Moab

Rock fragments on surface—30 percent gravel, 5 percent cobble
0 to 2 inches—brown gravelly loam
2 to 11 inches—brown very gravelly loam
11 to 38 inches—pinkish white and pinkish gray very gravelly loam
38 to 60 inches—brown very gravelly loam

Soil Properties and Qualities

Poley

Parent material: alluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: slow
Hazard of water erosion: very slight
Hazard of wind erosion: slight
Shrink-swell potential: high

Moab

Parent material: alluvium from limestone
Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: low
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate to severe
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 10 percent
- Soils moderately deep to basalt
- Soils shallow to a hardpan
- Areas of Barx soils
- Areas of Rock outcrop

Similar inclusions:
- Soils that are similar to Moab but that have less than 40 percent calcium carbonate equivalent in the lower profile

Use and Management

Rangeland

Dominant vegetation on the Poley soil:
- Potential plant community—western wheatgrass, blue grama, fourwing saltbush, big sagebrush
- Present plant community—blue grama, galleta, fourwing saltbush, big sagebrush

Important forage species: Indian ricegrass, western wheatgrass, blue grama, fourwing saltbush
Dominant vegetation on the Moab soil:

• Potential plant community—black grama, blue grama, galleta, big sagebrush
• Present plant community—blue grama, bottlebrush squirreltail, galleta, big sagebrush
Important forage species: black grama, blue grama, Indian ricegrass, Mormon-tea
Major management factors: low available water capacity, hazard of water erosion (Moab), high shrink-swell (Poley)
General management considerations on the Poley and Moab soils:
• On the Poley part, range seeding is limited because of frost heaving of the seedlings.
• Grazing on the Poley part should be delayed until the soil is firm enough to withstand trampling.
• Accessibility and availability of water cause livestock to prefer the Moab part over other soils in the area which could result in overgrazing.
• Brush management can be used where undesirable species have increased significantly.
Suitable management practices:
• Proper grazing use
• Fencing
• Deferred grazing

Wildlife Habitat

Suitability of the Poley and Moab soils for herbaceous plants and shrubs: moderately suited
Management considerations:
• Open rangeland wildlife prefer the Moab soils.
• Competition between wildlife and cattle can be severe during all seasons.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Range site: Poley soil—Clay Loam Upland 10-14" p.z.; Moab—Loamy Upland 10-14" p.z.

50—Radnik fine sandy loam, 1 to 5 percent slopes

Setting

Landform: alluvial fans
Flooding: rare
Elevation: 4,900 to 5,100 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Radnick soil and similar soils: 95 percent
Contrasting inclusions: 5 percent

Typical Profile

0 to 60 inches—reddish brown fine sandy loam

Soil Properties and Qualities

Parent material: alluvium from sandstone
Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: moderate
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: moderately high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 5 percent
• Soils that are similar to Radnik but have more than 35 percent rock fragments
• Soils that are similar to Radnik but are on fan terraces and stream terraces
• Soils that are loamy fine sand throughout
• Areas of sand dunes
Similar inclusions:
• Soils that have silt loam, loam or loamy fine sand surfaces

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—Indian ricegrass, needleandthread, blue grama, big sagebrush
• Present plant community—blue grama, Indian ricegrass, big sagebrush, Mormon-tea
Important forage species: blue grama, Indian ricegrass, galleta, squirreltail
Major management factors: hazard of wind erosion, sheet flooding
General management considerations:
• This unit responds well to good management.
• Livestock grazing should be managed to protect the soil from excessive erosion.
• Areas where brush is removed may be subject to greater hazard of erosion.
• Easy access and large variety of palatable plants encourage a constant grazing pressure.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing
• Brush management

Cropland

General management considerations:
• Low annual precipitation limits the crops that can be grown on this soil.
• Irrigation is required for maximum production of crops.
• Yields—alfalfa, 4 tons; barley, 4,500 pounds; wheat, 3,000 pounds; pasture 12-15 AUM.
Suitable management practices:
• Suitable irrigation systems are sprinkler and trickle.
• Wind erosion can be reduced by maintaining plant cover, keeping mulch on the surface, keeping the surface of the soil rough and limiting the width of strips of unprotected soil.
• Crops that tolerate drought are best suited. The moisture available is not adequate for good growth of other crops.

Building Site Development

General management considerations:
• Excavation increases the risk of wind and water erosion.
• This soil overflow floods that have up to 2 inches of water during high intensity storms.
Suitable management practices:
• Revegetate disturbed areas at construction sites as soon as possible to reduce the risk of wind erosion.
• Reduce the risk of erosion and maintenance cost by stabilizing areas that have been disturbed.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• To minimize subsidence, use the fill as a base for structures only after the material has been compacted.
• Consider the depth to which frost penetrates in designing footings and road bases.
• Offset the risk of corrosion to uncoated steel by using corrosion-resistant material or by using coatings and cathodic protectors.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Design roads to control surface runoff and stabilize cut slopes.
• Provide drains to control surface runoff and keep soil loss at a minimum.
• Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
• Seed road cuts and fills to permanent vegetation.
• Reduce damage from flooding by providing drainage around buildings that have basements and crawl spaces.
• Reduce the risk of flooding by constructing small dikes, providing interceptor ditches and establishing adequate outlets and drainageways.
• Protect onsite sewage disposal systems from flooding.

Landscaping

Suitable management practices:
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping of slopes.
• Either select plants that tolerate droughtiness or provide irrigation.

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
• Scattered pinyon-juniper trees add structural diversity to this open grassland.

Interpretive Groups

Land capability classification: IIe, irrigated; VIe, nonirrigated
Range site: Sandy Loam Upland, Calcareous 10-14" p.z.

51—Riverwash

Riverwash consists of unstabilized areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

52—Royosa fine sand, 2 to 10 percent slopes

Setting

Landform: plateaus
Flooding: none
Elevation: 5,600 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Royosa soil and similar soils: 95 percent

Contrasting inclusions: 5 percent

Typical Profile

0 to 2 inches—reddish yellow fine sand
2 to 60 inches—brown, strong brown and reddish brown loamy fine sand

Soil Properties and Qualities

Parent material: eolian sands from sandstone
Depth class: very deep
Drainage class: excessively drained
Permeability: rapid
Available water capacity: low
Potential rooting depth: 40 to 60 inches
Runoff: very slow and slow
Hazard of water erosion: moderate
Hazard of wind erosion: very high

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 10 percent
• Soils that are shallow to bedrock
• Areas of Tonalea soils
Similar inclusions:
• Soils that have slopes of less than 2 percent

Use and Management

Rangeland

Dominant vegetation:
• Potential plant community—Indian ricegrass, muttongrass, sandhill muhly, Mormon-tea
• Present plant community—sandhill muhly, Indian ricegrass, antelope bitterbrush, blue grama
Important forage species: Indian ricegrass, antelope bitterbrush, blue grama, bottlebrush squirreltail
Major management factors: hazard of wind erosion, low available water capacity
General management considerations:
• This soil is poorly suited to practices such as brush management and seeding because it is extremely droughty and is more susceptible to wind erosion and water erosion if it is disturbed.
• This soil is limited for earthen water impoundments because of seepage potential.
• Livestock have difficulty traversing this soil because of the loose sand.
• Several browse species palatable to both livestock and wildlife occur on this soil. Deferred grazing and the proper timing and amount of use by livestock help to maintain plant vigor and provide food and cover for wildlife.
• Ground cover should be maintained or improved to reduce the hazard of erosion by wind.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Deferred grazing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
• Water is lacking.
• Vegetation diversity is good.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Sandy Upland, Moderately Deep 14-18" p.z.

53—Royosa-Tonalea complex, 1 to 15 percent slopes

Setting

Landform: plateaus
Landscape position: Royosa—dunes on lower portions of slopes and concave positions; Tonalea—dunes on upper convex slopes
Flooding: none
Slope range: Royosa—1 to 10 percent; Tonalea—3 to 15 percent
Elevation: 5,600 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Royosa and similar soils: 65 percent
Tonalea and similar soils: 25 percent
Contrasting inclusions: 10 percent

Typical Profile

Royosa

0 to 2 inches—reddish yellow fine sand
2 to 60 inches—brown, strong brown and reddish yellow fine sand and loamy fine sand

Tonalea

0 to 2 inches—strong brown fine sand

2 to 30 inches—brown fine sand
30 inches—sandstone

Soil Properties and Qualities

Royosa

Parent material: eolian sands from sandstone
Depth class: very deep
Drainage class: excessively drained
Permeability: rapid
Available water capacity: low
Potential rooting depth: 60 inches or more
Runoff: very slow and slow
Hazard of water erosion: moderate
Hazard of wind erosion: very high

Tonalea

Parent material: eolian sands from sandstone
Depth class: moderately deep
Drainage class: excessively drained
Permeability: rapid
Available water capacity: very low
Potential rooting depth: 20 to 40 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: very high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 15 percent
- Soils that are shallow to sandstone
- Areas of Rock outcrop
- Soils that have a clay increase in the subsoil
- Areas of ponderosa pine on Moquith Mountain

Use and Management

Grazeable Woodland

Dominant vegetation on the Royosa soil:
- Potential plant community—sandhill muhly, Indian ricegrass, pinyon, Mormon-tea
- Present plant community—sand dropseed, Indian ricegrass, sandhill muhly, pinyon

Important forage species: Indian ricegrass, sand dropseed, blue grama, antelope bitterbrush
Dominant vegetation on the Tonalea soil:
- Potential plant community—pinyon, juniper, Indian ricegrass, blue grama
- Present plant community—Indian ricegrass, sandhill muhly, blue grama, pinyon, juniper

Important forage species: Indian ricegrass, blue grama, antelope bitterbrush
Major management factors: hazard of wind erosion, Rock outcrop, very low available water capacity
General management considerations on the Royosa and Tonalea soils:
- Ground cover should be maintained or improved to reduce hazard of wind erosion.
- This unit is limited for earthen impoundments because of bedrock (Tonalea) and seepage potential.
- Overstory production of fuelwood for Tonalea is 5-6 cords per acre.
- Use brush management in areas where unpalatable species have increased significantly on the Royosa soil.

Suitable management practices:
- Proper grazing use
- Proper woodland grazing
- Fencing
- Access roads
- Forest land erosion control system

Wildlife Habitat

Suitability of the Royosa and Tonalea soils for coniferous trees: moderately suited
Management considerations:
- These woodlands provide habitat for many species.
- Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Woodland site: Sandy Upland, Moderately Deep 14-18" p.z.

54—Saido-Brinkerhoff complex, 1 to 5 percent slopes

Setting

Landform: fan terraces
Flooding: none
Slope range: 1 to 5 percent
Elevation: 4,600 to 5,100 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Saido and similar soils: 70 percent
Brinkerhoff and similar soils: 20 percent
Contrasting inclusions: 10 percent

Typical Profile

Saido

0 to 1 inch—light brown silt loam
1 to 9 inches—pink silt loam
9 to 45 inches—pinkish white silt loam

45 to 60 inches—pinkish white and reddish yellow silt loam

Brinkerhoff

0 to 4 inches—brown loam
4 to 12 inches—yellowish red sandy loam
12 to 17 inches—light brown sandy loam
17 to 28 inches—yellowish red loamy sand
28 to 50 inches—light reddish brown and reddish brown gravelly coarse sand high in gypsum
50 to 60 inches—reddish brown gravelly coarse sand

Soil Properties and Qualities

Saido

Parent material: alluvium from gypsiferous shales and mudstone
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: low
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate to severe
Hazard of wind erosion: slight
Corrosivity: Concrete—high

Brinkerhoff

Parent material: alluvium from sandstone and gypsiferous shales
Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Available water capacity: low
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight
Corrosivity: Concrete—high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 5 percent
- Areas of Grieta soils

Similar inclusions:
- Soils that are similar to Saido but that have a sandy loam profile
- Soils that are similar to Brinkerhoff but clayey in the subsoil

Use and Management

Rangeland

Dominant vegetation on the Saido soil:
- Potential plant community—Indian ricegrass, needleandthread, gyp dropseed, shadscale
- Present plant community—galleta, snakeweed, squirreltail, shadscale

Important forage species: galleta, Indian ricegrass, squirreltail, fourwing saltbush
Dominant vegetation on the Brinkerhoff soil:
- Potential plant community—Indian ricegrass, fourwing saltbush, galleta, Mormon-tea
- Present plant community—blue grama, squirreltail, needleandthread, fourwing saltbush

Important forage species: galleta, Indian ricegrass, squirreltail, fourwing saltbush
Major management factors: content of gypsum, hazard of water erosion (Saido); low available water capacity
General management considerations on the Saido-Brinkerhoff soils:
- Grazing should be managed to protect the soil from excessive erosion.
- The Saido part has a relatively low productivity of forage plants.
- The Brinkerhoff part is preferred by livestock to most others in the area because of accessibility and the availability of water. This results in overgrazing and subsequent deterioration of the desirable vegetation.
- On the Saido part desirable grasses are very slow to recover even that have the best grazing management.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Brush management

Wildlife Habitat

Suitability of the Saido soil for herbaceous plants and shrubs: poorly suited
Suitability for the Brinkerhoff soil for herbaceous plants and shrubs: moderately suited
Management consideration:
- Water is lacking.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
Range site: Saido—Gypsum Upland 7-11" p.z.; Brinkerhoff—Loamy Upland 7-11" p.z.

55—Sheppard fine sand, 1 to 7 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 4,600 to 5,000 feet

Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Sheppard soil and similar soils: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

0 to 2 inches—reddish brown fine sand
2 to 60 inches—yellowish red loamy fine sand

Soil Properties and Qualities

Parent material: eolian sands from sandstone
Depth class: very deep
Drainage class: somewhat excessively drained
Permeability: rapid
Available water capacity: low
Potential rooting depth: 60 inches or more
Runoff: very slow and slow
Hazard of water erosion: moderate
Hazard of wind erosion: very high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 7 percent
- Areas of Monue soils
- Soils high in gypsum
- Areas of active dunes

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—Indian ricegrass, needleandthread, galleta, sand sagebrush
- Present plant community—Indian ricegrass, needlegrasses, sand sagebrush, snakeweed

Important forage species: Indian ricegrass, galleta, squirreltail, fourwing saltbush
Major management factors: hazard of wind erosion, low available water capacity
General management considerations:
- Ground cover should be maintained or improved to reduce the hazard of erosion by wind.
- Earthen water impoundments are limited because of seepage potential.
- Readily responds to good management.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Brush management

Building Site Development

General management considerations:
- This soil is highly susceptible to wind erosion.
- Excavation increases the risk of water erosion.
- Cutbanks are not stable and therefore are subject to slumping.
- The quality of roadbeds can be adversely affected by limited soil strength.

Suitable management practices:
- Revegetate disturbed areas at construction sites as soon as possible to reduce the risk of wind erosion.
- Reduce the risk of erosion and maintenance cost by stabilizing areas that have been disturbed.
- Preserve the existing plant cover during construction to reduce the risk of erosion.
- To minimize subsidence, use the fill as a base for structures only after the material has been compacted.
- Construct special retainer walls in shallow excavations to prevent cutbanks from caving in.
- Consider the depth to which frost penetrates in designing footings and road bases.
- Offset the risk of corrosion to uncoated steel by using corrosion-resistant material or by using coatings and cathodic protectors.
- Provide a stable base and an adequate wearing surface to improve road trafficability.
- Install culverts to carry seasonal runoff where roads cross natural drainageways.
- Design roads to control surface runoff and stabilize cut slopes.
- Provide drains to control surface runoff and keep soil loss at a minimum.
- Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
- Seed road cuts and fills to permanent vegetation.

Landscaping

Suitable management practices:
- Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping of slopes.
- Either select plants that tolerate droughtiness or provide irrigation.

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
- Fair diversity for food and cover.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Sandy Upland 7-11" p.z.

56—Sheppard loamy fine sand, 1 to 4 percent slopes, gullied

Setting

Landform: stream terraces
Flooding: none
Elevation: 4,600 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Sheppard soil and similar soils: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

0 to 2 inches—reddish brown loamy fine sand
2 to 60 inches—yellowish red loamy fine sand

Soil Properties and Qualities

Parent material: alluvium and eolian sands from sandstone
Depth class: very deep
Drainage class: somewhat excessively drained
Permeability: rapid
Available water capacity: low
Potential rooting depth: 60 inches or more
Runoff: very slow
Hazard of water erosion: slight, with gullying potential
Hazard of wind erosion: high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 4 percent
- Areas of active sand dunes
- Soils high in gypsum
- Areas of Monue soils

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—Indian ricegrass, needleandthread, galleta, sand sagebrush
- Present plant community—Indian ricegrass, needlegrasses, sand sagebrush, snakeweed

Important forage species: Indian ricegrass, galleta, squirreltail, fourwing saltbush
Major management factors: low available water capacity, hazard of wind erosion, gully erosion
General management considerations:
- Ground cover should be maintained or improved to reduce the hazard of erosion by wind.
- Earthen water impoundments are limited because of seepage potential.
- Readily responds to good management.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Brush management

Building Site Development

General management considerations:
- This soil is highly susceptible to wind erosion.
- Excavation increases the risk of water erosion.
- Cutbanks are not stable and therefore are subject to slumping.
- The quality of roadbeds can be adversely affected by limited soil strength.

Suitable management practices:
- Revegetate disturbed areas at construction sites as soon as possible to reduce the risk of wind erosion.
- Reduce the risk of erosion and maintenance cost by stabilizing areas that have been disturbed.
- Preserve the existing plant cover during construction to reduce the risk of erosion.
- To minimize subsidence, use the fill as a base for structures only after the material has been compacted.
- Construct special retainer walls in shallow excavations to prevent cutbanks from caving in.
- Consider the depth to which frost penetrates in designing footings and road bases.
- Offset the risk of corrosion to uncoated steel by using corrosion-resistant material or by using coatings and cathodic protectors.
- Provide a stable base and an adequate wearing surface to improve road trafficability.
- Install culverts to carry seasonal runoff where roads cross natural drainageways.
- Design roads to control surface runoff and stabilize cut slopes.
- Provide drains to control surface runoff and keep soil loss at a minimum.
- Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
- Seed road cuts and fills to permanent vegetation.

Landscaping

Suitable management practices:
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping of slopes.
• Either select plants that tolerate droughtiness or provide irrigation.

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
• Fair diversity for food and cover.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Sandy Upland 7-11" p.z.

57—Showlow-Section complex, 1 to 15 percent slopes

Setting

Landform: hills and fan terraces
Flooding: none
Slope range: 1 to 15 percent
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Showlow and similar soils: 45 percent
Section and similar soils: 35 percent
Contrasting inclusions: 20 percent

Typical Profile

Showlow

Rock fragments on the surface: 20 percent cobble, 10 percent gravel
0 to 3 inches—brown cobbly silty clay loam
3 to 7 inches—brown clay loam
7 to 42 inches—brown silty clay
42 to 52 inches—reddish brown and pink gravelly clay loam
52 to 60 inches—light reddish brown and pink gravelly loam

Section

Rock fragments on the surface: 20 percent gravel
0 to 2 inches—dark brown gravelly loam
2 to 6 inches—dark brown loam
6 to 34 inches—light brown loam
34 to 60 inches—reddish brown loam

Soil Properties and Qualities

Showlow

Parent material: alluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate to severe
Hazard of wind erosion: very slight
Shrink-swell potential: high

Section

Parent material: alluvium and colluvium from limestone and volcanic rocks
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: high
Potential rooting depth: 40 to 60 inches or more
Runoff: medium
Hazard of water erosion: severe
Hazard of wind erosion: moderate

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 15 percent
• Soils shallow to bedrock
• Soils moderately deep to bedrock
• Soils that are shallow to a lime cemented hardpan
• Soils that have more than 40 percent calcium carbonate equivalent in the control section
Similar inclusions:
• Soils that are similar to Section but have more than 35 percent rock fragments
• Soils that are similar to Showlow but have more than 35 percent rock fragments

Use and Management

Grazeable Woodland

Dominant vegetation on the Showlow soil:
• Potential plant community—juniper, pinyon, western wheatgrass, winterfat
• Present plant community—juniper, pinyon, snakeweed
Important forage species: western wheatgrass, winterfat, blue grama, fourwing saltbush

Dominant vegetation on the Section soil:
• Potential plant community—juniper, pinyon, western wheatgrass, blue grama
• Present plant community—juniper, pinyon, blue grama, sagebrush
Important forage species: western wheatgrass, blue grama, fourwing saltbush
Major management factors: slow permeability, shrink-swell (Showlow), hazard of water erosion
General management considerations on the Showlow and Section soils:
• Fuelwood production for the Showlow part is 5 cords/acre and for the Section part is 6-7 cords/acre.
• This unit is well suited to the production of pinyon and juniper.
• Reduce risk of erosion by proper installation and maintenance of access roads.
• Both soils have moderate to severe erosion hazard which limits vehicle access.
Suitable management practices:
• Proper woodland grazing
• Access roads
• Forest land erosion control system
• Forest land management

Wildlife Habitat

Suitability of the Showlow and Section soils for coniferous trees: moderately suited
Management considerations:
• These woodlands of pinyon-juniper provide habitat for many species.
• Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIe,nonirrigated
Woodland site: Showlow—Clay Loam Upland 14-18" p.z.; Section—Loamy Upland 14-18" p.z.

58—Showlow-Thimble complex, 1 to 15 percent slopes

Setting

Landform: Showlow—hills and fan terraces; Thimble—hills
Landscape position: Showlow—toeslopes, footslopes, and intermingled; Thimble—backslopes, summits, and intermingled
Flooding: none
Slope range: 1 to 15 percent
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Showlow and similar soils: 50 percent
Thimble and similar soils: 25 percent
Contrasting inclusions: 25 percent

Typical Profile

Showlow

Rock fragments on surface—10 percent gravel
0 to 3 inches—brown silty clay loam
3 to 7 inches—brown clay loam
7 to 42 inches—brown silty clay
42 to 52 inches—reddish brown and pink gravelly clay loam
52 to 60 inches—light reddish brown and pink gravelly loam

Thimble

Rock fragments on the surface: 15 percent cobble, 15 percent gravel
0 to 1 inch—brown cobbly clay loam
1 to 13 inches—dark brown very cobbly clay
13 to 19 inches—dark brown very cobbly clay loam
19 inches—basalt

Soil Properties and Qualities

Showlow

Parent material: alluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate to very severe
Hazard of wind erosion: moderate
Shrink-swell potential: high

Thimble

Parent material: alluvium from basalt and pyroclastics
Depth class: shallow
Drainage class: well drained
Permeability: slow
Available water capacity: very low
Potential rooting depth: 10 to 20 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight
Shrink-swell potential: high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 15 percent
- Areas that have up to 20 percent cobbles and 5 percent stones

Similar inclusions:
- Soils that are similar to Thimble but that have a loamy profile
- Soils that are similar to Thimble but that have a lime cemented hardpan above the bedrock

Use and Management

Grazeable Woodland

Dominant vegetation on the Showlow soil:
- Potential plant community—juniper, pinyon, western wheatgrass, winterfat
- Present plant community—juniper, pinyon, snakeweed

Important forage species: western wheatgrass, winterfat, blue grama, fourwing saltbush
Dominant vegetation on the Thimble soil:
- Potential plant community—juniper, pinyon, sideoats grama, cliffrose
- Present plant community—juniper, pinyon, blue grama, cliffrose

Important forage species: sideoats grama, muttongrass, bitterbrush
Major management factors: depth to bedrock, very low available water capacity (Thimble), hazard of water erosion (Showlow), permeability, shrink-swell
General management considerations on the Showlow-Thimble soils:
- Fuelwood production for the Showlow part is 5 cords/acre and for the Thimble part is 2-3 cords/acre.
- The Showlow part is well suited to the production of juniper and pinyon.
- The Thimble part is slow to respond to management, especially in areas of historical concentration of animals.
- Reduce risk of erosion by proper installation and maintenance of access roads.
- Both have moderate to severe erosion hazard which limits vehicle access.

Suitable management practices:
- Proper woodland grazing
- Planned grazing system
- Range seeding
- Forest land erosion control system
- Forest land management
- Access roads

Wildlife Habitat

Suitability of the Showlow and Thimble soils for coniferous trees: moderately suited
Management considerations:
- These woodlands of pinyon-juniper provide habitat for many species.
- Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Woodland site: Showlow—Clay Loam Upland 14-18" p.z.; Thimble—Basalt Upland 14-18" p.z.

59—Showlow very cobbly clay loam, 1 to 15 percent slopes

Setting

Landform: hills and fan terraces
Flooding: none
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Showlow soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 25 percent cobble, 30 percent gravel
0 to 3 inches—brown very cobbly clay loam
3 to 7 inches—brown clay loam
7 to 42 inches—brown silty clay
42 to 52 inches—reddish brown and pink very gravelly clay loam
52 to 60 inches—light reddish brown and pink very gravelly loam

Soil Properties and Qualities

Parent material: alluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: very slight

Shrink-swell potential: high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 15 percent
- Areas of Prieta gravelly loam
- Areas of Curhollow gravelly loam
- A deep extremely gravelly soil that has lime throughout the profile
- Areas that have up to 10 percent stones and/or 70 percent gravel
- Areas of Rock outcrop

Similar inclusions:
- Soils that have greater than 35 percent rock fragments throughout the profile.
- Areas that have surface cobble of less than 35 percent

Use and Management

Grazeable Woodland

Dominant vegetation:
- Potential plant community—juniper, pinyon, western wheatgrass, winterfat
- Present plant community—juniper, pinyon, big sagebrush, bottlebrush squirreltail

Important forage species: western wheatgrass, winterfat, blue grama, fourwing saltbush
Major management factors: slow permeability, high shrink-swell
General management considerations:
- Fuelwood production for this unit is 4 cords/acre.
- This unit is well suited to the production of pinyon and juniper.
- Reduce risk of erosion by proper installation and maintenance of access roads.
- Moderate erosion hazard limits vehicle access.

Suitable management practices:
- Proper woodland grazing
- Access roads
- Forest land erosion control
- Forest land management

Wildlife Habitat

Suitability for coniferous trees: moderately suited
Management considerations:
- These woodlands of pinyon-juniper provide habitat for many species.
- Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Woodland site: Clay Loam Upland 14-18" p.z.

60—Showlow very cobbly silty clay loam, 15 to 35 percent slopes

Setting

Landform: hills and fan terraces
Flooding: none
Elevation: 5,500 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Showlow soil and similar soils: 80 percent
Contrasting inclusions: 20 percent

Typical Profile

Rock fragments on surface: 25 percent cobble, 15 percent gravel
0 to 3 inches—brown very cobbly silty clay loam
3 to 7 inches—brown clay loam
7 to 42 inches—brown silty clay
42 to 52 inches—reddish brown and pink very gravelly clay loam
52 to 60 inches—light reddish brown and pink very gravelly loam

Soil Properties and Qualities

Parent material: alluvium and colluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: rapid
Hazard of water erosion: very severe
Hazard of wind erosion: very slight
Shrink-swell potential: high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 35 percent
- Soils that are similar to Showlow but that have greater than 35 percent rock fragments in the profile
- Areas of Rock outcrop
- Stony and very stony areas
- Soils that are more limy
- Soils that are loamy throughout

Similar inclusions:
- Soils that have slopes of less than 15 percent

Use and Management

Grazeable Woodland

Dominant vegetation:
- Potential plant community—big sagebrush, juniper, pinyon, bottlebrush squirreltail
- Present plant community—juniper, pinyon, western wheatgrass, winterfat

Important forage species: western wheatgrass, winterfat, blue grama, fourwing saltbush
Major management factors: slow permeability, high shrink-swell, hazard of water erosion, slope
General management considerations:
- Fuelwood production for this unit is 5 cords/acre.
- This unit is well suited to the production of pinyon and juniper.
- Reduce risk of erosion by proper installation and maintenance of access roads.
- Moderate to severe erosion hazard limits vehicle access.

Suitable management practices:
- Proper woodland grazing
- Access roads
- Forest land erosion control system
- Forest land management

Wildlife Habitat

Suitability for coniferous trees: moderately suited
Management considerations:
- These woodlands of pinyon-juniper provide habitat for many species.
- Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Woodland site: Clay Loam Upland 14-18" p.z.

61—Sponiker gravelly loam, 1 to 15 percent slopes

Setting

Landform: hills and fan terraces
Flooding: none
Elevation: 6,400 to 7,200 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 120 to 135 days

Composition

Sponiker soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 5 percent gravel
1 to 0 inches—pine needles
0 to 4 inches—dark brown gravelly loam
4 to 12 inches—dark brown clay loam
12 to 22 inches—dark brown cobbly clay loam
22 to 30 inches—brown clay
30 to 60 inches—reddish brown clay

Soil Properties and Qualities

Parent material: alluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: severe
Hazard of wind erosion: very slight
Shrink-swell potential: high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 15 percent
- Soils that are loamy throughout
- Soils that are moderately deep to bedrock
- Soils that are similar to Sponiker but are on flood plains and stream terraces
- Areas of Wukoki soils
- Areas of Lomaki soils
- Soils that are less than 20 inches to weathered bedrock

Use and Management

Grazeable Woodland

Dominant vegetation:
- Potential plant community—Ponderosa pine, juniper, pinyon, muttongrass (fig. 7)
- Present plant community—Ponderosa pine, juniper, pinyon, Arizona fescue

Important forage species: muttongrass, mountain muhly, squirreltail
Major management factors: permeability, shrink-swell, hazard of water erosion

General management considerations:
- A moderate erosion hazard requires care in using equipment during harvest.
- Grazing should be closely regulated to protect the limited forage species production.
- Grazing should be excluded from areas of harvesting

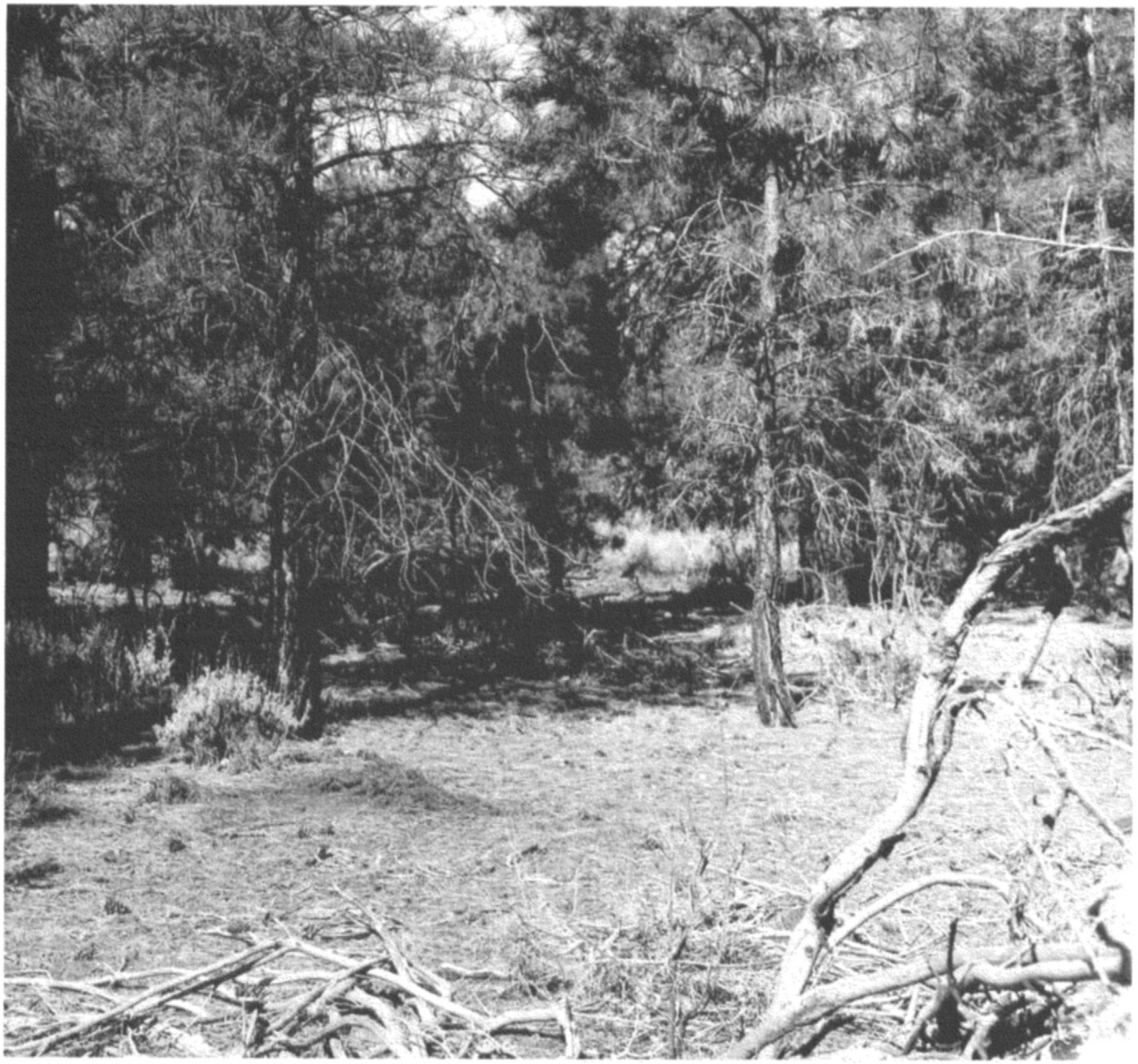

Figure 7.—Areas of Sponiker gravelly loam, 1 to 15 percent slopes. Vegetation is mainly ponderosa pine and big sagebrush.

and plantations until native species have become well established.

Suitable management practices:

- Proper woodland grazing
- Access roads
- Forest land erosion control system
- Forest land management
- Woodland improved harvesting
- Woodland improvement

Wildlife Habitat

Suitability for coniferous trees: moderately suited

Management considerations:

- These woodlands of ponderosa pine provide habitat for many species.
- Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Woodland site: Loamy Upland 17-25" p.z.

62—Sponiker gravelly loam, 15 to 40 percent slopes

Setting

Landform: hills and fan terraces
Flooding: none
Elevation: 6,400 to 7,200 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 120 to 135 days

Composition

Sponiker soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 20 percent gravel
1 to 0 inches—pine needles
0 to 4 inches—dark brown gravelly loam
4 to 12 inches—dark brown clay loam
12 to 22 inches—dark brown cobbly clay loam
22 to 30 inches—brown clay
30 to 60 inches—reddish brown clay

Soil Properties and Qualities

Parent material: alluvium from basalt and pyroclastics
Depth class: very deep
Drainage class: well drained
Permeability: slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: rapid
Hazard of water erosion: very severe
Hazard of wind erosion: very slight
Shrink-swell potential: high

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 40 percent
- Soils that are less than 20 inches to bedrock
- Areas of Rock outcrop
- Soils that are loamy throughout
- Areas that have up to 35 percent cobble and/or stones
- Areas of Wukoki soils
- Areas of Lomaki soils

Similar inclusions:
- Soils that have slopes of less than 15 percent

Use and Management

Grazeable Woodland

Dominant vegetation:
- Potential plant community—Ponderosa pine, muttongrass, juniper, pinyon
- Present plant community—Ponderosa pine, juniper, pinyon, Arizona fescue

Important forage species: muttongrass, mountain muhly, squirreltail
Major management factors: permeability, shrink-swell, hazard of water erosion
General management considerations:
- A moderate erosion hazard requires care in using equipment during harvest.
- Moderate erosion hazard and steep slopes limit vehicle access.
- Grazing should be excluded from areas of harvesting and plantations until native species have become well established.
- Steep slopes limit livestock access and results in overgrazing of the less sloping areas.

Suitable management practices:
- Proper woodland grazing
- Access roads
- Forest land erosion control system
- Forest land management
- Woodland improved harvesting
- Woodland improvement

Wildlife Habitat

Suitability for coniferous trees: moderately suited
Management considerations:
- These woodlands of ponderosa pine provide habitat for many species.
- Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Woodland site: Loamy Upland 17-25" p.z.

63—Torriorthents-Rock outcrop complex, 30 to 70 percent slopes

Setting

Landform: hills and escarpments (fig. 8)
Flooding: none
Elevation: 5,000 to 7,200 feet

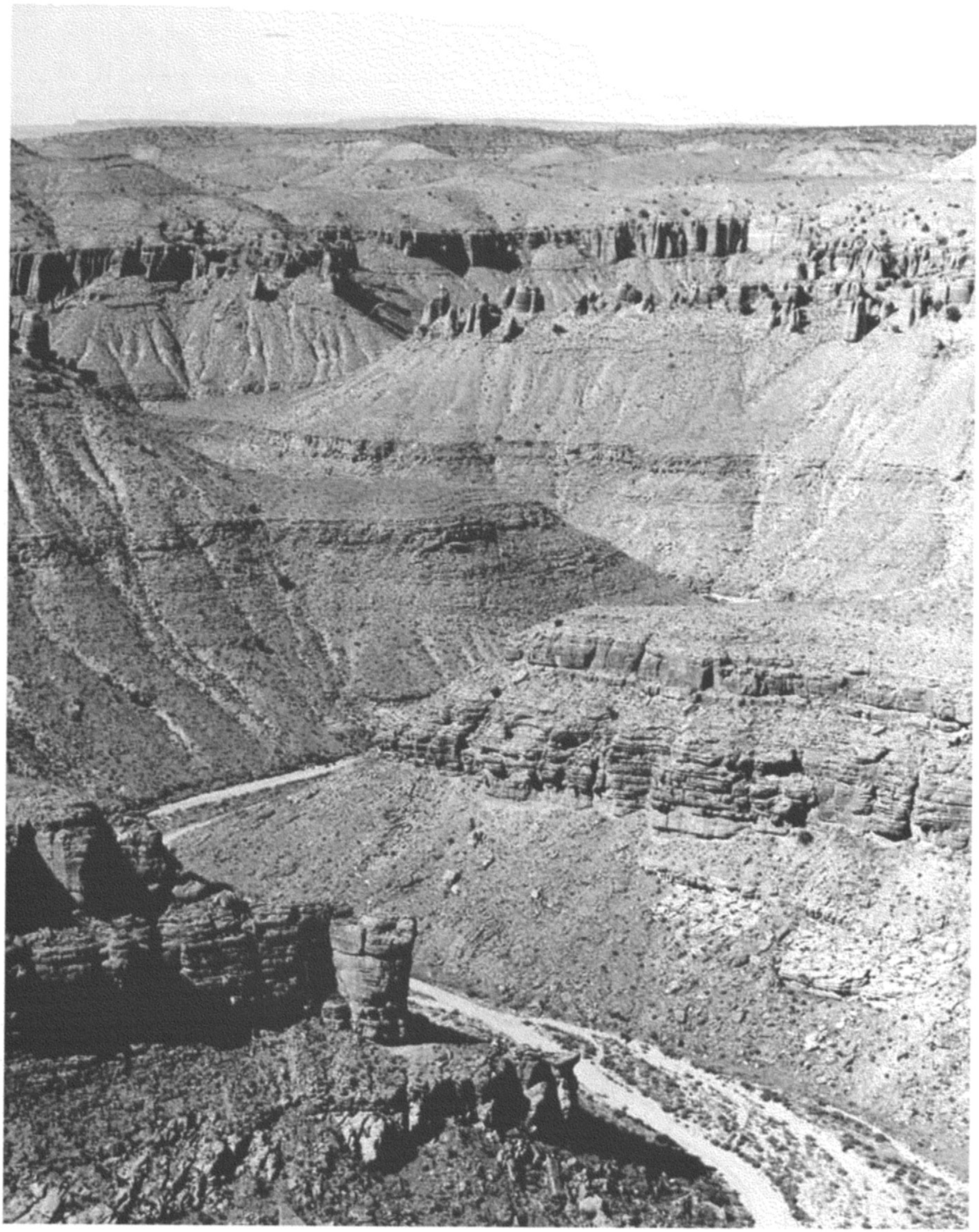

Figure 8.—Areas of Torriorthents-Rock outcrop complex, dry, 30 to 70 percent slopes, in Hacks Canyon.

Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Torriorthents soil and similar soils: 50 percent
Rock outcrop: 45 percent
Contrasting inclusions: 5 percent

Reference Profile

Torriorthents

Rock fragments on surface: variable
These soils are highly variable in surface and subsurface textures and in depth to bedrock or weathered bedrock.
Rock outcrop consists of areas of sandstone, shale and/or mudstone.

Soil Properties and Qualities

Parent material: mixed colluvium
Depth class: very shallow to very deep
Drainage class: well to somewhat excessively drained
Permeability: very slow to very rapid
Available water capacity: very low to high
Potential rooting depth: 4 to more than 60 inches
Runoff: very rapid
Hazard of water erosion: very severe
Hazard of wind erosion: variable

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 30 percent
- Kanab Creek, a perennial stream

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—Indian ricegrass, blue grama, muttongrass, squirreltail
- Present plant community—Indian ricegrass, blue grama, needlandthread, big sagebrush

Important forage species: muttongrass, Indian ricegrass, blue grama, fourwing saltbush
Major management factors: slope, Rock outcrop, hazard of water erosion
General management considerations:
- Steep slopes and rock outcrop limit movement by livestock and results in overgrazing of lesser sloping areas.
- Management alternatives are very limited because of steep slopes and Rock outcrop.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
- The small amount of vegetation produced is offset by the variety which attracts many species.
- The steep slopes and broken topography provide safety from danger for wildlife.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Breaks 10-14" p.z.
Rock outcrop is not assigned a capability classification or a range site.

64—Torriorthents-Rock outcrop complex, dry, 30 to 70 percent slopes

Setting

Landform: hills and escarpments
Landscape position: canyon walls and sides of plateaus and mesas
Flooding: none
Elevation: 4,400 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days

Composition

Torriorthents soil and similar soils: 50 percent
Rock outcrop: 45 percent
Contrasting inclusions: 5 percent

Reference Profile

Torriorthents

Rock fragments on surface: 60 to 100 percent cobble, stones and/or boulders.
These soils are highly variable in surface and subsurface textures and in depth to bedrock or weathered bedrock.
Rock outcrop consists of exposed areas of sandstone, shale and/or mudstone.

Soil Properties and Qualities

Parent material: mixed colluvium
Depth class: very shallow to very deep
Drainage class: well to somewhat excessively drained
Permeability: very slow to very rapid

Available water capacity: very low to high
Potential rooting depth: variable
Runoff: very rapid
Hazard of water erosion: very severe
Hazard of wind erosion: variable

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 30 percent
- Areas of Rubbleland

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—desert needlegrass, needleandthread, Indian ricegrass, Mormon-tea
- Present plant community—needleandthread, galleta, Mormon-tea, snakeweed

Important forage species: desert needlegrass, needleandthread, Indian ricegrass, galleta
Major management factors: slope, Rock outcrop, hazard of water erosion
General management considerations:
- Production of vegetation suitable for livestock grazing is limited by excessive runoff.
- Slope limits access by livestock and results in overgrazing of the less sloping areas.
- Trails or walkways can be constructed in places to encourage livestock to graze in areas where access is limited.
- Cattle usually avoid areas of this unit unless their movement is restricted by fences.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Stock trails and walkways

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
- The small amounts of vegetation produced is offset by the variety which attracts many species.
- Steep slopes and broken topography provide safety from danger for wildlife.
- The Rock outcrop grows no vegetation but is important for nest sites, resting cover, hunting perches, escape, and dens.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Breaks 7-11" p.z.

Rock outcrop is not assigned a capability classification or a range site.

65—Torriorthents-Rock outcrop complex, warm, 30 to 70 percent slopes

Setting

Landform: hills and escarpments
Flooding: none
Elevation: 3,500 to 4,800 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 65 to 72 degrees F
Frost-free period: 210 to 240 days

Composition

Torriorthents soil and similar soils: 50 percent
Rock outcrop: 45 percent
Contrasting inclusions: 5 percent

Reference Profile

Rock fragments on surface: variable
These soils are highly variable in surface and subsurface textures and in depth to bedrock or weathered bedrock.
Rock outcrop consists of exposed areas of sandstone, shale and/or mudstone.

Soil Properties and Qualities

Parent material: mixed colluvium
Depth class: very shallow to very deep
Drainage class: well to somewhat excessively drained
Permeability: very slow to very rapid
Available water capacity: very low to high
Potential rooting depth: 4 to 60 inches or more
Runoff: very rapid
Hazard of water erosion: very severe
Hazard of wind erosion: variable

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 30 percent
- Kanab Creek, a perennial stream
- Cliffs
- Areas of Rubbleland

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—desert needlegrass, Indian ricegrass, flattop buckwheat
- Present plant community—red brome, bush muhly, needlegrasses, cactus

Important forage species: Indian ricegrass, blue grama, big galleta, blue grama, bush muhly
Major management factors: slope, Rock outcrop, hazard of water erosion
General management considerations:
- Steep slopes and Rock outcrop limit access by livestock and results in overgrazing of lesser sloping areas.
- Management alternatives are very limited because of steep slopes and Rock outcrop.
- Distribution of livestock is the primary management problem.

Suitable management practices:
- Proper grazing use
- Fencing

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management considerations:
- The small amount of vegetation produced is offset by the variety which attracts many species.
- The steep slopes and broken topography provide safety from danger for wildlife.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Breaks 9-12" p.z.
Rock outcrop is not assigned a capability classification or a range site.

66—Whiskey silt loam, 1 to 4 percent slopes

Setting

Landform: stream terraces
Flooding: none
Elevation: 5,800 to 7,000 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Whiskey soil and similar soils: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

0 to 5 inches—brown silt loam
5 to 60 inches—dark brown loam

Soil Properties and Qualities

Parent material: mixed alluvium
Depth class: very deep
Drainage class: well drained
Permeability: moderate
Available water capacity: high
Potential rooting depth: 60 or more inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 4 percent
- Soils that are clayey

Similar inclusions:
- Soils that are silt loam throughout

Use and Management

Rangeland

Dominant vegetation:
- Potential plant community—blue grama, needleandthread, fourwing saltbush, ring muhly
- Present plant community—bigelow sage, blue grama, rabbitbrush

Important forage species: blue grama, needleandthread, galleta, fourwing saltbush
Major management factors: gully erosion
General management considerations:
- Livestock prefer this soil to most others in the area because of accessibility and the availability of water.
- This can result in overgrazing and subsequent deterioration of the vegetative community.
- This soil can be highly productive and responds well to management.
- Livestock should be managed to maintain the desired plant community to protect the soil from excessive erosion.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Deferred grazing
- Water developments

Wildlife Habitat

Suitability for herbaceous plants and shrubs: moderately suited
Management consideration:
- Open rangeland wildlife prefer this site.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Range site: Loamy Upland 14-18" p.z.

67—Wukoki-Lomaki complex, 15 to 50 percent slopes

Setting

Landform: cinder cones
Flooding: none
Slope range: 15 to 50 percent
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days

Composition

Wukoki and similar soils: 45 percent
Lomaki and similar soils: 40 percent
Contrasting inclusions: 15 percent

Typical Profile

Wukoki

Rock fragments on surface: 80 percent cinders
0 to 3 inches—yellowish brown extremely gravelly loam
3 to 10 inches—light yellowish brown extremely gravelly loam
10 to 60 inches—black cinders

Lomaki

Rock fragments on surface: 80 percent cinders
0 to 30 inches—yellowish brown extremely gravelly loam
30 to 60 inches—black cinders

Soil Properties and Qualities

Wukoki

Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Depth class: very deep (shallow to cinders)
Drainage class: somewhat excessively drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 60 inches or more
Runoff: rapid
Hazard of water erosion: severe
Hazard of wind erosion: very slight

Lomaki

Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Depth class: very deep (moderately deep to cinders)
Drainage class: somewhat excessively drained
Permeability: moderate
Available water capacity: low
Potential rooting depth: 60 inches or more
Runoff: rapid
Hazard of water erosion: severe
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 50 percent
- Soils that are deeper than 40 inches to cinders, usually on fan terraces
- Soils that are shallow to bedrock, usually that have slopes greater than 45 percent

Similar inclusions:
- Soils that have slopes of less than 15 percent

Use and Management

Rangeland

Dominant vegetation on the Wukoki soil:
- Potential plant community—needleandthread, big sagebrush, sideoats grama, black grama
- Present plant community—snakeweed, rabbitbrush, cheatgrass

Important forage species: sideoats grama, black grama, blue grama, needleandthread
Dominant vegetation on the Lomaki soil:
- Potential plant community—sideoats grama, black grama, needleandthread, big sagebrush
- Present plant community—blue grama, rabbitbrush, big sagebrush, snakeweed

Important forage species: sideoats grama, black grama, blue grama, needleandthread
Major management factors: very low available water capacity, slope, hazard of erosion by water
General management considerations on the Wukoki and Lomaki soils:
- Water developments are generally lacking on this unit.
- Low productivity and steep slopes limit management alternatives.
- Livestock grazing should be managed to protect the soil from excessive erosion because of the severe erosion hazard.
- Trails and walkways can be constructed in places to encourage livestock to graze in areas where access is limited.

Suitable management practices:
- Proper grazing use
- Planned grazing systems

- Fencing
- Deferred grazing
- Stock trails and walkways

Wildlife Habitat

Suitability of the Wukoki and Lomaki soils for herbaceous plants and shrubs: poorly suited
Management consideration:
- Water is lacking.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Range site: Cinder Hills 10-14" p.z.

68—Wutoma-Lozinta complex, 1 to 15 percent slopes

Setting

Landform: fan terraces
Landscape position: Wutoma—summits, shoulders, backslopes; Lozinta—toeslopes, footslopes and other concave slopes
Flooding: none
Slope range: 1 to 15 percent
Elevation: 6,600 to 7,200 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F

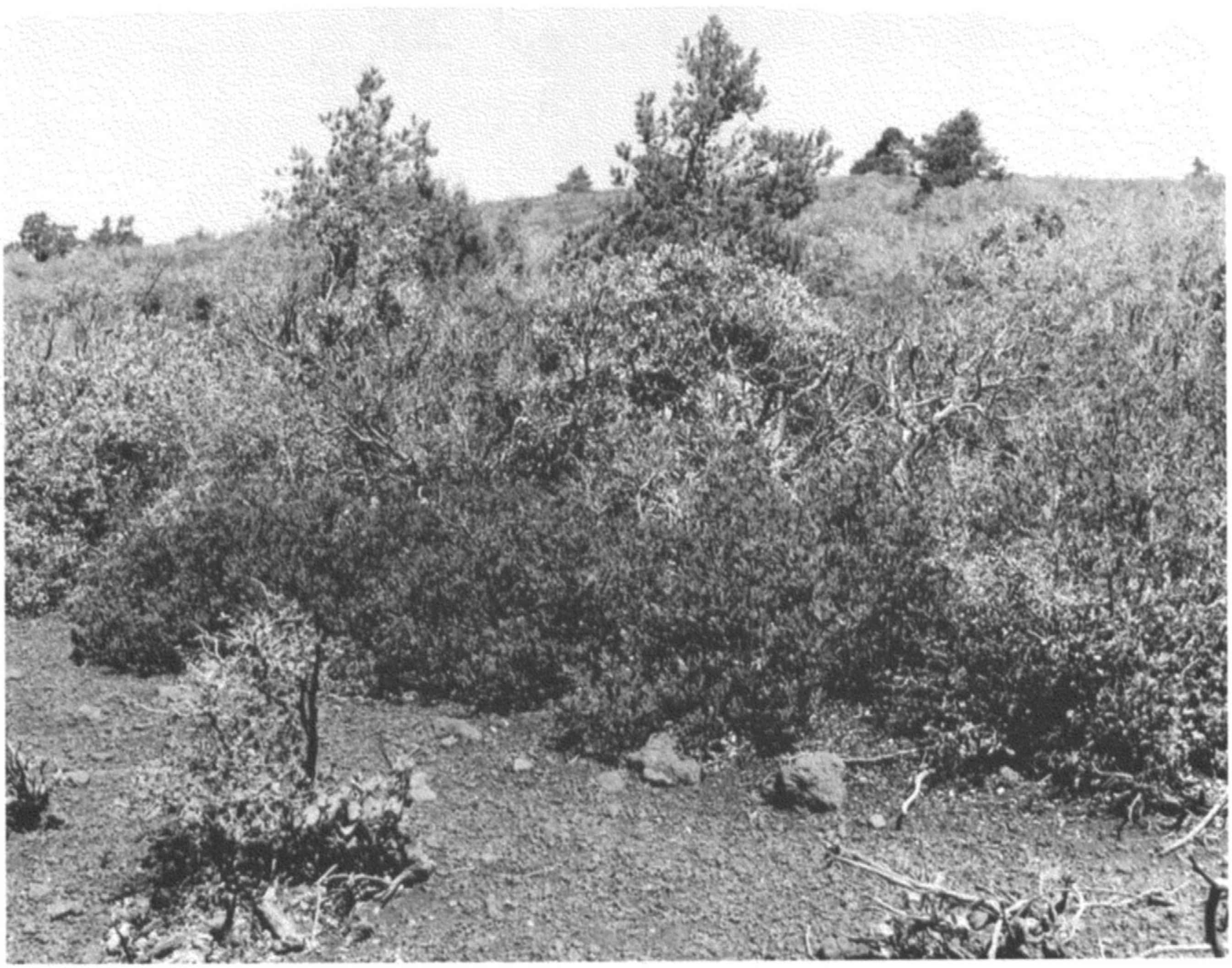

Figure 9.—Areas of Wutoma-Lozinta complex, 1 to 15 percent slopes. This soil is made up mostly of volcanic cinders.

Frost-free period: 135 to 150 days

Composition

Wutoma and similar soils: 70 percent
Lozinta and similar soils: 20 percent
Contrasting inclusions: 10 percent

Typical Profile

Wutoma

Rock fragments on surface—90 percent cinders (fig. 9)
0 to 12 inches—dark brown extremely gravelly loam
12 to 60 inches—black cinders

Lozinta

Rock fragments on surface—70 percent cinders
0 to 10 inches—dark brown extremely gravelly loam
10 to 24 inches—brown extremely gravelly loam
24 to 60 inches—black cinders

Soil Properties and Qualities

Wutoma

Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Depth class: very deep (shallow to cinders)
Drainage class: somewhat excessively drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: very slight

Lozinta

Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Depth class: very deep (moderately deep to cinders)
Drainage class: somewhat excessively drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 15 percent
• Soils that are similar to Lomaki but deeper than 40 inches to cinders on some fan terraces
• Areas of Sponiker soils

Use and Management

Grazeable Woodland

Dominant vegetation:
• Potential plant community—juniper, pinyon, blue grama, black grama
• Present plant community—juniper, pinyon, blue grama, algerita
Important forage species: blue grama, black grama, squirreltail, needleandthread
Major management factors: very low available water capacity
General management considerations on the Wutoma and Lozinta soils:
• This unit responds well to management.
• Production of fuelwood for this unit is 2-4 cords/acre.
• Water developments are generally lacking on this unit.
Suitable management practices:
• Proper woodland grazing
• Planned grazing systems
• Fencing
• Deferred grazing
• Access roads

Wildlife Habitat

Suitability of the Wutoma and Lozinta soil for coniferous trees: moderately suited
Management considerations:
• These woodlands of pinyon-juniper provide habitat for many species.
• Firewood gatherers should not disturb nest trees.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Woodland site: Wutoma—Cinder Upland 14-18" p.z.; Lozinta—Cinder Upland 14-18" p.z.

69—Wutoma-Lozinta complex, 15 to 50 percent slopes

Setting

Landform: cinder cones
Landscape position: Wutoma—summits, shoulders, backslopes; Lozinta—toeslopes, footslopes, and other concave slopes
Flooding: none
Slope range: 15 to 50 percent
Elevation: 6,600 to 7,200 feet
Mean annual precipitation: 14 to 18 inches

Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Wutoma and similar soils: 60 percent
Lozinta and similar soils: 30 percent
Contrasting inclusions: 10 percent

Typical Profile

Wutoma

Rock fragments on surface—90 percent cinders
0 to 12 inches—dark brown extremely gravelly loam
12 to 60 inches—black cinders

Lozinta

Rock fragments on surface—1 inch layer of cinders
0 to 10 inches—dark brown extremely gravelly loam
10 to 24 inches—brown extremely gravelly loam
24 to 60 inches—black cinders

Soil Properties and Qualities

Wutoma

Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Depth class: very deep (shallow to cinders)
Drainage class: somewhat excessively drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 60 inches or more
Runoff: rapid
Hazard of water erosion: severe
Hazard of wind erosion: very slight

Lozinta

Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Depth class: very deep (moderately deep to cinders)
Drainage class: somewhat excessively drained
Permeability: moderate
Available water capacity: low
Potential rooting depth: 60 inches or more
Runoff: rapid
Hazard of water erosion: severe
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 50 percent
- Areas of Rock outcrop
- Soils less than 20 inches to bedrock
- Areas of Sponiker soils
- Areas of higher precipitation supporting a vegetative cover of ponderosa pine

Similar inclusions:
- Soils deeper than 40 inches to cinders
- Soils that have slopes of less than 15 percent

Use and Management

Grazeable Woodland

Dominant vegetation on the Wutoma soil:
- Potential plant community—juniper, pinyon, black grama, squirreltail
- Present plant community—juniper, pinyon, Turbinella oak, squirreltail

Important forage species: black grama, needleandthread, squirreltail
Dominant vegetation on the Lozinta soil:
- Potential plant community—juniper, pinyon, black grama, squirreltail
- Present plant community—juniper, pinyon, Turbinella oak, New Mexico locust

Important forage species: black grama, needlandthread, squirreltail
Major management factors: very low to low available water capacity, slope, hazard of water erosion
General management considerations on the Wutoma and Lozinta soils:
- Production of vegetation suitable for livestock grazing is limited by low available water capacity.
- Slope limits access by livestock and results in overgrazing of the less sloping areas.
- Cattle usually avoid areas of this unit unless their movement is restricted by fences.
- Trails and walkways can be constructed in places to encourage livestock to graze in areas where access is limited.

Suitable management practices:
- Proper grazing use
- Planned grazing systems
- Fencing
- Stock trails and walkways

Wildlife Habitat

Suitability of the Wutoma and Lozinta soil for coniferous trees: moderately suited
Management considerations:
- These woodlands of pinyon-juniper provide habitat for many species.

- Firewood gatherers should not disturb nest trees.
- Steep slopes and broken topography provide safety from danger for wildlife.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Woodland site: Cinder Hills 14-18" p.z.

70—Wutoma-Rock outcrop complex, 1 to 15 percent slopes

Setting

Landform: fan terraces
Flooding: none
Elevation: 6,500 to 6,700 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Wutoma soil and similar soils: 60 percent
Rock outcrop: 30 percent
Contrasting inclusions: 10 percent

Typical Profile

Wutoma

Rock fragments on surface: 20 percent stones
0 to 12 inches—dark brown stony loam
12 to 60 inches—black cinders

Rock outcrop consists of areas of basalt.

Soil Properties and Qualities

Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Depth class: very deep but shallow to cinders
Drainage class: somewhat excessively drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
- Soils that have slopes of more than 15 percent
- Areas of Lomaki soils
- Areas of Sponiker soils
- Soils that are 10 to 20 inches to bedrock

Similar inclusions:
- Areas of Wutoma very cindery loam and extremely cindery loam

Use and Management

Grazeable Woodland

Dominant vegetation:
- Potential plant community—juniper, pinyon, blue grama, black grama
- Present plant community—juniper, pinyon, black grama, blue grama, algerita

Important forage species: blue grama, black grama, squirreltail, needleandthread
Major management factors: Rock outcrop, very low available water capacity
General management considerations:
- This unit responds moderately well to management.
- Production of fuelwood for this unit is 2-4 cords/acre.
- Water developments are generally lacking on this unit.

Suitable management practices:
- Proper woodland grazing
- Planned grazing systems
- Fencing
- Deferred grazing
- Access roads

Wildlife Habitat

Suitability for herbaceous plants and shrubs: poorly suited
Management considerations:
- Water is lacking.
- The Rock outcrop grows no vegetation but is important for nest sites, resting cover, hunting perches, escape, and dens.

Interpretive Groups

Land capability classification: VIs, nonirrigated
Woodland site: Cinder Upland 14-18" p.z.
Rock outcrop is not assigned a capability subclass or a range site.

71—Yumtheska-Goesling complex, 1 to 15 percent slopes

Setting

Landform: Yumtheska—hills; Goesling—stream terraces
Landscape position: Yumtheska—higher convex positions; Goesling—concave positions
Flooding: none
Slope range: Yumtheska—1 to 15 percent; Goesling—1 to 5 percent
Elevation: 5,800 to 6,200 feet

Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Yumtheska and similar soils: 60 percent
Goesling and similar soils: 25 percent
Contrasting inclusions: 15 percent

Typical Profile

Yumtheska

Rock fragments on surface—60 percent gravel
0 to 12 inches—brown very gravelly loam
12 inches—limestone

Goesling

Rock fragments on surface—10 percent gravel
0 to 8 inches—dark brown loam
8 to 24 inches—brown loam
24 to 60 inches—light brown loam

Soil Properties and Qualities

Yumtheska

Parent material: alluvium from limestone
Depth class: very shallow and shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 7 to 20 inches
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: very slight

Goesling

Parent material: alluvium from limestone
Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Available water capacity: high
Potential rooting depth: 60 inches or more
Runoff: medium
Hazard of water erosion: moderate
Hazard of wind erosion: slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 15 percent
• Deep soils that have less clay in the profile on stream terraces and flood plains
• Areas of Rock outcrop
Similar inclusions:
• Soils that are similar to Goesling but that have redder hue

Use and Management

Grazeable Woodland-Rangeland

Dominant vegetation on the Yumtheska soil:
• Potential plant community—juniper, pinyon, blue grama, needleandthread
• Present plant community—juniper, pinyon, blue grama, snakeweed
Important forage species: blue grama, needleandthread, cliffrose
Dominant vegetation on the Goesling soil:
• Potential plant community—blue grama, needleandthread, winterfat, big sagebrush
• Present plant community—big sagebrush, blue grama, squirreltail, juniper
Important forage species: blue grama, squirreltail, needleandthread, winterfat
Major management factors: depth to bedrock, very low available water capacity (Yumtheska)
General management considerations on the Yumtheska and Goesling soils:
• Brush management and range seeding are limited by shallow depth and very low available water capacity on the Yumtheska part.
• Moderate erosion hazard limits vehicle access which requires proper installation and maintenance of access roads.
• On the Yumtheska part fuelwood production is 3-5 cords/acre.
• Earthen water impoundments are limited because of shallow depth to bedrock on the Yumtheska part.
Suitable management practices:
• Proper grazing use
• Planned grazing systems
• Fencing
• Access roads

Wildlife Habitat

Suitability of the Yumtheska soil for coniferous trees: moderately suited
Management considerations:
• These woodlands of pinyon-juniper provide habitat for many species.
• Firewood gatherers should not disturb nest trees.
• Brush management must be carefully planned.
Suitability for the Goesling soil for herbaceous plants and shrubs: moderately suited
Management considerations:
• Open rangeland wildlife prefer this site.
• When pinyon and juniper trees are on this site it is more desirable for wildlife.

Interpretive Groups

Land capability classification: VIs, nonirrigated

Figure 10.—Areas of Limestone Hills, 14- to 18-inch p.z. range site on Yumtheska very gravelly loam, 4 to 20 percent slopes showing the beneficial effects of chaining.

Woodland site: Yumtheska—Shallow Loamy 14-18" p.z.
Range site: Goesling—Loamy Upland 14-18" p.z.

72—Yumtheska very gravelly loam, 4 to 20 percent slopes

Setting

Landform: hills
Flooding: none
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Yumtheska soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 10 percent cobble, 40 percent gravel
0 to 12 inches—brown very gravelly loam
12 inches—limestone

Soil Properties and Qualities

Parent material: alluvium from limestone
Depth class: very shallow and shallow
Drainage class: well drained
Permeability: moderate

Available water capacity: very low
Potential rooting depth: 7 to 20 inches
Runoff: rapid
Hazard of water erosion: severe
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 20 percent
• Soils that are moderately deep and deep on toeslopes and fan terraces
• Soils that are shallow that have a hardpan
• Deep soils on stream terraces that have a clay increase in the subsoil
• Areas of Thimble soils
Similar inclusions:
• Soils that are similar to Yumtheska but that have a clay increase in the subsoil

Use and Management

Grazeable Woodland

Dominant vegetation:
• Potential plant community—juniper, pinyon, blue grama, needleandthread
• Present plant community—juniper, pinyon, blue grama, snakeweed
Important forage species: blue grama, needleandthread, cliffrose
Major management factors: depth to bedrock, very low available water capacity, hazard of water erosion
General management considerations:
• On this unit, fuelwood production is 3-5 cords/acre (fig. 10).
• Brush management and range seeding are limited because of shallow depth and low available water capacity.
• Moderate to severe erosion hazard limits vehicle access which requires proper installation and maintenance of access roads.

Suitable management practices:
• Proper woodland grazing
• Planned grazing systems
• Fencing
• Access roads
• Forest land erosion control system

Wildlife Habitat

Suitability for coniferous trees: moderately suited
Management considerations:
• These woodlands of pinyon-juniper provide habitat for many species.
• Firewood gatherers should not disturb nest trees.
• Brush management must be carefully planned.

Interpretive Groups

Land capability classification: VIe, nonirrigated
Woodland site: Shallow Loamy 14-18" p.z.

73—Yumtheska very gravelly loam, 30 to 50 percent slopes

Setting

Landform: hills
Flooding: none
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days

Composition

Yumtheska soil and similar soils: 75 percent
Contrasting inclusions: 25 percent

Typical Profile

Rock fragments on surface: 60 percent gravel
0 to 12 inches—brown very gravelly loam
12 inches—limestone

Soil Properties and Qualities

Parent material: alluvium and colluvium from limestone
Depth class: very shallow and shallow
Drainage class: well drained
Permeability: moderate
Available water capacity: very low
Potential rooting depth: 7 to 20 inches
Runoff: very rapid
Hazard of water erosion: very severe
Hazard of wind erosion: very slight

Inclusions

Contrasting inclusions:
• Soils that have slopes of more than 50 percent
• Areas that have 40 percent cobble, occasional Rock outcrop, and 5 percent stones mostly on the ridges and occasionally on some hills
• Soils that are deep or moderately deep to limestone that have slopes of greater than 40 percent on hills, and slopes of less than 30 percent on toeslopes and stream terraces
• Areas of cliffs
Similar inclusions:
• Soils that have slopes of less than 30 percent

Use and Management

Grazeable Woodland

Dominant vegetation:
• Potential plant community—juniper, pinyon, needleandthread, big sagebrush
• Present plant community—juniper, pinyon, blue grama, cliffrose, snakeweed
Important forage species: blue grama, needleandthread, cliffrose
Major management factors: depth to bedrock, very low available water capacity, hazard of water erosion, slope
General management considerations:
• Brush management and range seeding is limited by shallow depth and very low available water capacity.
• Moderate to severe erosion hazard and steep slopes limit vehicle access.
• Reduce risk of erosion by proper installation and maintenance of access roads.
• Fuelwood production for this unit is 3-5 cords/acre.
• Steep slopes limit access by livestock and results in overgrazing of lesser sloping areas.
• Management alternatives are very limited because of steep slopes.
Suitable management practices:
• Access roads
• Forest land erosion control system
• Planned grazing systems
• Proper woodland grazing
• Fencing

Wildlife Habitat

Suitability for coniferous trees: moderately suited
Management considerations:
• These woodlands of pinyon-juniper provide habitat for many species.
• Firewood gatherers should not disturb nest trees.
• Brush management must be carefully planned.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
Woodland site: Limestone Hills 14-18" p.z.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate potential sources of sand and gravel, roadfill, and topsoil. They can use it to help identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation. Onsite evaluations should be made prior to use.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It may be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those items needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed below. This list does not constitute a recommendation for a particular land use. Soils that have climatic limitations, such as inadequate rainfall, qualify for prime farmland only in those areas where these limitations have been overcome by irrigation. The need for these measures is indicated after the map unit name. Onsite evaluation is

needed to determine whether or not these limitations have been overcome by corrective measures.

2 Barx fine sandy loam, 1 to 5 percent slopes (where irrigated)

50 Radnik fine sandy loam, 1 to 5 percent slopes (where irrigated)

Irrigated Crops and Pasture

Steve Cassady, District Conservationist, Natural Resources Conservation Service, prepared this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information, including estimated yields of the main crops grown, given in the description of each soil under "Detailed soil map units."

Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

About 1,250 acres of land in the survey area is used for irrigated farming. About three-fourths of this land is found in the Colorado City area. Other farming areas include the Kaibab-Paiute Tribal farm, Moccasin Community and Cane Beds. The main crops grown are pasture grass, alfalfa hay, small grains, field corn, and sorghum.

Irrigation water is obtained through various methods in the survey area. Colorado City obtains most of its irrigation water from wells but supplements this with diversion from Short Creek stored in irrigation reservoirs. All irrigation water for the Kaibab-Paiute Tribal farm is supplied by wells. The Moccasin Community obtains its irrigation water from springs and wells.

Proper management of the irrigated soils of the area requires good planning and implementation. The aim of sound management is to produce the greatest amount of the most needed crops while protecting and improving the soil. To achieve this aim, the land must be protected according to its needs and used within its capabilities. This can be done by using plants that are well suited to the soil, applying soil management practices that protect the soil, and keeping the soil in good physical condition.

In addition to the irrigated cropland, there is a small amount of dryland cropland in the survey area. The greatest concentration of this is in the Colorado City-Cane Beds area. Some dryland farming has occurred in the Pipe Valley and Mt. Trumbull areas also. The major dryland crop is fall-planted small grains to be pastured or harvested the following spring.

The following paragraphs generally describe the principal soil management practices needed in the survey area. Although the soils in the area differ in management needs, certain practices apply to all the soils that are cropped with the exception of Irrigation Water Management which applies only to irrigated soils.

Conservation Cropping Sequence

A conservation cropping sequence is the growing of crops in combination with needed cultural and management measures. If soil-improving crops and practices more than offset the soil-depleting crops and deteriorating practices, then it is a good conservation cropping sequence.

Soil-improving practices in a conservation cropping sequence include the use of rotations that contain grasses and legumes, the return of crop residue to the soil, proper tillage, adequate fertilization, weed and pest control measures, and other good management practices.

A typical cropping sequence used in the survey area is growing alfalfa for 6 to 8 years, growing small grain or field corn for 2 years, and then growing alfalfa again. The crop residue of the small grain or field corn is returned to the soil, and tillage is reduced to only those operations that are necessary.

Crop Residue Use

Crop residue management is the leaving of plant residue in cultivated fields. The residue is incorporated into the soil or leaving it on the surface during that part of the year when erosion is likely to occur. Plant residue adds organic matter. A major benefit of organic matter in the soil is its influence on the development and stabilization of good soil structure and its relationship to the general physical environment of the soil, which influences crop growth. Organic matter functions mainly as it decomposes. The application of nitrogen fertilizer to the soil aids in the decomposition process.

It is particularly important that organic matter be continuously returned to the soil. The easiest and most common way to add organic matter to the soil is to return plant residue produced by a crop. Unless sufficient crop residue is returned to the soil, the

physical condition of the soil declines, soil compaction begins, and slower water infiltration and poorer aeration result.

Conservation Tillage

Conservation tillage is a tillage and planting system in which adequate crop residue is left to protect the soil surface from water or wind erosion.

To protect against water erosion a minimum of 30 percent of the soil surface should be left covered by plant residue after planting. Where soil erosion by wind is the primary concern, at least 1,000 pounds per acre of flat small grain residue-equivalent should be left on the surface during the critical erosion period.

Irrigation Water Management

Irrigation water management concerns regulation of applications of irrigation water at rates and in amounts that will insure high crop production and minimum soil and water losses. It is needed in all irrigated areas. Good irrigation water management is the efficient application of water according to crop needs and at rates and in amounts consistent with the characteristics of the soil.

Efficient delivery of water to farms is the first step in supplying the moisture needed by growing crops. A good distribution system is one that has enough capacity to meet the needs of the crops irrigated and efficiently conveys water without excessive seepage and without causing erosion.

Next, the water must be delivered from the distribution system to the individual fields. Irrigation pipelines, irrigation ponds, and pumpback systems are common components of efficient farm irrigation systems.

Surface or flood irrigation is one type of irrigation system used in the survey area. This method of irrigation utilizes borders or furrows to control the application of water. Leveling fields to uniform slopes is required for high irrigation efficiencies. On land that cannot be leveled because of high expense or soil limitations, sprinkler or drip irrigation systems can be used. Sprinkler and drip systems often have higher irrigation efficiencies than surface irrigation systems, but normally require a greater initial cost to install.

If water is to be applied efficiently, a farmer needs to give special attention to the kind of crop and the soil to be irrigated. Efficient irrigation adjusts to the needs of the crop, the soil-moisture relationship at the time of irrigation, the slope of the field, the length of irrigation runs, the time it takes to apply the water, the intake rate of the soil, and other factors that may be significant at the specific time of irrigation. Forty-eight hours after irrigation, a soil check can be made to determine whether the desired moisture was added.

Pasture management

Proper pasture management is grazing pasture in a manner that maintains grasses and legumes of high quality, provides an adequate supply of forage, and protects the soil from erosion. These objectives can be accomplished by using several pastures with a rotation system that allows for controlled grazing periods and adequate rest periods in each field.

Proper rotation of livestock should allow a stubble height of 3 to 4 inches following each grazing period to be maintained throughout the growing season for most grasses. A regrowth period of 24 to 30 days between each grazing period of a field is usually recommended for most grasses. Care should be taken to keep livestock off the pastures when they are wet. If livestock are allowed to graze wet pastures, the soil is compacted, the water intake rate is decreased, and soil structure is destroyed.

Pastures should have proper irrigation water management. Over-irrigating reduces yields by leaching nutrients below the root zone and reducing oxygen availability in the soil for proper root growth. Commercial fertilizers and barnyard manure, if it is available, should be applied to increase yields. Weeds can generally be controlled by mowing.

Hayland management

Hayland management is the proper treatment and use of hayland to prolong the life of desirable forage species, to maintain or improve the quality and quantity of the forage, and to protect the soil and reduce water loss.

Adapted varieties of alfalfa or other hayland species should be used to increase crop yields. These plants must be able to withstand climatic extremes and still produce high yields during the relatively short growing season. Inoculated seed should be used in planting. A companion crop may be needed when planting if wind erosion is a hazard.

The proper management of established stands of hay should regulate the frequency and amount of irrigation water applied. The recommended time to cut alfalfa is when approximately 25 percent of the stems have one or more flowers open. A mowing height of 2 to 3 inches should be maintained to prevent injury to new buds and shoots. Fertilization is essential to

ensure proper growth and good crop yields. Fertilization rates depend upon the soil and the crop grown.

Crop yields are included in "Detailed soil map units" section.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in the map unit descriptions. In any given year, yields may be higher or lower than those indicated because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby survey areas and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains

only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of the components of each map unit is given in the section "Detailed Soil Map Units."

Range Management

Larry Ellicott, Range Conservationist, Natural Resources Conservation Service, prepared this section.

About 87 percent of the land in the survey area is rangeland. This section describes the principles of range management and defines range site and condition.

Production of healthy plant cover conserves and protects soil, moisture, and plant resources. A harvest of high quality forage can be insured by maintaining the native vegetation or by improving it to its highest potential. Grasses manufacture the food they need to grow, flower, and reproduce. If the plants are properly managed, they will remain healthy and vigorous for many, many years.

Effective management of rangeland depends upon many factors. The season of use, intensity of use, kinds and distribution of grazing animals, and a knowledge of the resource capability are very important management considerations.

The primary objective in range management is to control grazing so that the plants growing on a site are similar in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the maximum potential meets grazing needs, provides for wildlife habitat, and protects the soils and water resources.

The forage plants in many parts of the survey area have been depleted by excessive and untimely use. There has been a general reduction in cool-season grasses and a general increase in woody, non-forage plants. Productivity of forage plants generally is below the potential of the soils. Uneven livestock distribution has created localized overuse and under-use of forage. Gully erosion is extensive on some flood plain and stream terrace soils, and sheet erosion occurs on some of the upland soils.

Many areas that were once open grassland have been encroached upon by juniper trees. Adequate fuel, which the herbaceous plants once provided, is now inadequate to carry the natural fires that once controlled the encroachment of juniper. Broom snakeweed, a half-shrub, has also dramatically increased, particularly on the shallow soils. These woody plants compete for soil moisture with forage plants that should dominate the sites.

Abnormal amounts of woody plants, excessive erosion, and the abundance of toxic plants are all symptoms of a deteriorated range condition. However, a systematic range improvement program can help correct this situation.

Shrubs and trees can be managed in a number of ways. Several mechanical forms of brush management have been used in the survey area. Large areas of juniper have been mechanically treated. Chaining, cabling, or pushing of trees has met with mixed success. The use of herbicides, particularly on shrubby plants, is effective if soil moisture and other growing conditions are satisfactory. Seeding should be done after brush management in areas where understory vegetation is lacking.

Gully erosion has a profound effect on forage production of flood plain and stream terrace soils. These soils are potentially the most productive ones in the survey area. When the plant cover on these soils deteriorates, they are more susceptible to erosion. Some sites receive extra runoff from adjacent area and readily respond to management. The best treatment of these sites is to allow them to be deferred from livestock grazing during the growing season of the important forage species. Other suitable treatment practices for these sites are water spreading and grade stabilization structures. Where these sites are in poor or fair condition the improvement can be accelerated by seeding locally adapted forage plants. The exception to this is areas where the average annual rainfall is less than 10 inches and on shallow soils. These factors, when combined, reduce the feasibility of seeding because low water availability hinders the establishment and growth of plants.

Gully erosion can be partially controlled by adequate treatment and management of the upland soils that contribute runoff to the lower-lying areas. Severely depleted upland sites may require range seeding of adapted species to increase the ground cover. Increasing the plant cover slows water runoff, increases moisture infiltration, improves growing conditions, and reduces sheet erosion.

Management of the rangeland resources in this area should be directed toward meeting the native plant requirements. Critical growth stages in the native plant community must be recognized and considered when

selecting a grazing management program. A systematic grazing program should include proper stocking levels and protection from continuous use. Livestock distribution can be improved by fencing and developing additional water facilities. Priority should be given to permanent livestock water facilities. Livestock water ponds are not dependable and can cause grazing distribution problems. Wells, pipelines, storage tanks, and spring developments are much more dependable means of providing water. Fences should be used to divide pastures into manageable units. Fences and watering facilities can be used to force animals to use areas that might otherwise be underused.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil on the site. Effective management is based on the relationship between the soils, vegetation, and water. All of the soils in this survey area that are used for grazing are grouped into range sites. A range site is the product of all environmental factors responsible for its development. It is a distinctive kind of rangeland that has the capability of producing a characteristic native plant community. A characteristic native plant community consists of a balance of grasses, forbs and shrubs that make up the potential plant community. Over time, on undisturbed sites, a mixture of plants best suited for growing on a site has developed. This group of plants is called the potential natural plant community. This plant community differs in kind, amount or proportion from plant communities on other range sites. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, lime or salt content, and topographic position are also important.

Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only. It does not automatically establish a value of the present plant community for any given use.

Table 5 shows, for each soil, the range site and the total annual production of vegetation in favorable, normal and unfavorable years. Total annual production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, twigs, flowers, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and temperature make growing conditions substantially better than average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Dry weight is the total annual yield per acre reduced by a common percent of moisture content.

Woodland Management

Larry Ellicott, Range Conservationist, Natural Resources Conservation Service, prepared this section.

About 13 percent of the land in the survey area is woodland.

The juniper and pinyon pine woodland occurs between the ponderosa pine forests and the cold desert grassland. This cold-adapted evergreen woodland is characterized by the unequal dominance of two conifers—juniper and pinyon. Structurally, these juniper-pinyon woodlands are among the simplest communities in the southwest. Juniper-pinyon woodland covers extensive areas between 4,000 and 7,500 feet. It reaches its greatest development on mesas, plateaus, piedmonts, slopes, and ridges. Juniper grows at lower elevations and drier sites. Pinyon grows at higher elevations and in areas of higher precipitation. In the middle is a mixture. On the east side of the survey area Utah juniper (juniperous osteosperma) and Colorado pinyon (Pinus edulis) are the most common species. On the west side of the survey area Colorado pinyon is replaced by the single leaf pinyon (Pinus monophylla) in the association with the Utah juniper.

Juniper and pinyon tend to grow on rocky habitats with shallow soils predominating. A consistent indicator of a site that the native potential plant community is juniper-pinyon is the stoniness or coarseness of the soil. Soil moisture availability is the major factor controlling plant community patterns. Rapid infiltration, deep penetration, and low soil moisture tension will favor the dominance of woodland over grassland. The root systems of pinyon pine and juniper are well adapted to these sites.

The lower elevation side of this zone grades into grassland and savanna-like landscapes. Here the understory is typically composed of grasses such as blue grama and galleta with low shrubs such as groundsel and snakeweed, and the overstory is dominated by juniper that is low in productivity. In the middle to upper parts of the juniper-pinyon zone, sagebrush is the major component of the understory. Other understory components of general or regional importance are rabbitbrush, winterfat, black sage, black brush, cliffrose, barberry, along with such cacti

as hedgehogs, prickly pears, and chollas. The high elevation contact of the juniper-pinyon zone is the ponderosa pine forest at or about 7,000 to 8,000 feet elevation. Here the overstory is dominated by pinyon, and productivity of both species is at their highest.

Historically, stands of pinyon pine and juniper were restricted to certain sites. In the last 100 years, junipers have invaded many areas of former grassland. Some of the reasons for this are warmer temperature trends over the last 100+ years, wetter conditions in the last half of the 19th century, reduction of wildfires as a result of fire prevention and suppression efforts, and heavy grazing which reduced the competition and fuels. Young trees are very susceptible to grass fires until their crowns grow well above the grasses; consequently, fires normally eliminate or greatly thin tree seedlings on soils that produce good stands of grass. Between about 15 and 40 years are needed for trees to grow tall enough to resist grass fires. Attempts to "reconvert" areas in deep soils of finer textures where grasses are better suited can be successful.

In this survey area, there are two small zones of ponderosa pine. These occur from around 7,000 feet in elevation to the tops of Mount Logan (7,866 ft.) and Mount Trumbull (8,029 ft.). Although small in extent they do produce merchantable timber and were logged in the past to provide lumber for building in nearby communities. Ponderosa pine grows in open sunlight and is not shade tolerant. It requires bare mineral soil to establish and grows best when thinned at regular intervals as it matures. On south-facing slopes and dry ridges pinyon pine (pinus edulis) and juniper (juniperous osteosperma) grow in association with the ponderosa pine. Open stands of ponderosa pine will grow enough grass and other forage type plants to provide grazing to livestock and wildlife. Plants that can be found in the understory include Arizona and sheep fescue, junegrass, mountain muhly, and bluegrasses.

Woodland Management and Productivity

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; and *S*, sandy texture. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, D, C, and S.

In the table, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent.

A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years, except for the pinyon-juniper forest type, for which site index is determined by basal area. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

The species that is followed by an asterisk under *common trees* is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Woodland Understory Vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some woodland can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Table 5 shows, for each soil suitable for woodland, the potential for producing understory vegetation. The total production of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4.5 feet. It is expressed in pounds per acre of air-dry vegetation in favorable, normal, and unfavorable years. In a favorable year, soil moisture is above average during the optimum part of the growing season; in a normal year, soil moisture is average; and in an unfavorable year, it is below average.

The table also lists the common names of the characteristic vegetation on each soil and the *composition*, by percentage of air-dry weight, of each kind of plant. The table shows the kind and percentage of understory plants expected under a canopy density that is most nearly typical of woodland in which the production of wood crops is highest.

Wildlife Habitat

David W. Seery, State Biologist, Natural Resources Conservation Service, prepared this section.

The kind and abundance of wildlife depend largely on the amount and distribution of food, cover and water. Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They

also affect the construction of water impoundments. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

There are six main areas containing wildlife habitat in the survey area. These are discussed and listed below:

Woodlands

Pinyon and juniper woodlands are found on uplands interspersed with sagebrush. This creates a mosaic of woodland and open grassland which allows wildlife species to travel between food and cover. Many birds and animals use pinyon for food. Hawks and owls nest in juniper trees.

Cold Desert Grasslands

Plant production on shallow soils is low, and wildlife use is less than other more productive sites. Very little protective cover exists for large game species. Areas where soils are deeper provide a better mixed-grass community which is the main habitat for pronghorn. The grass provides good cover for newborn fawns.

Cold Desert Shrub

The cool dry climate favors shrubs and drought-hearty grasses. Water is limited. The shrub and mixed grassland plant communities support several important big game species such as pronghorn, mule deer, and desert bighorn sheep. This community contains a good variety of shrubs, grasses, and forbs which support many species of wildlife. These upland sites are found on stream terraces above the flood plains and on side slopes of plateaus.

Breaks

These are the steep, broken lands on the edges of mesas and mountains. Breaks are eroded with a lot of ridges and gullies. Although these sites produce lower amounts of vegetation than other sites, they are very important for wildlife. Many different kinds of plants grow on breaks. The plant variety and rough terrain attract wildlife. Scattered trees grow on many of these areas and are hunting perches for predatory birds.

Rock Outcrop

Although these areas produce almost no vegetation, the cracks, caves, cliffs, and ledges are important to wildlife. Birds of prey use cliffs and ledges for nesting, roosting, and observation. Bighorn sheep use the cliffs and ledges for escape and resting areas. Overhangs provide protection from weather. Bats roost during the day in cracks and caves. Mountain lions ambush prey from rocks and rest under overhangs.

Riparian and Wetlands

Some flood plains and stream drainages have hardwood trees such as cottonwood, willow, ash, and walnut. This riparian vegetation may have been removed and could be restored in stream beds with wet soil. A few wet mountain meadows and isolated springs contain small herbaceous wetlands.

Each soil or map unit is rated for its ability to produce wildlife habitat and placed into suitability groups as described below.

Well suited—Soil properties are such that vegetation can be improved, managed, or created with few or no soil limitations.

Moderately suited—Soil properties are such that vegetation can be improved, managed, or created but soil limitations are moderate and management is necessary to maintain the habitat.

Poorly suited—Soil limitations are severe. Management is possible, but creating or improving vegetation is difficult, and success is questionable.

Very poorly suited—Soil limitations are such that it is impractical to attempt to create or improve vegetation, and failure is highly probable.

The suitabilities apply to this survey area and cannot be compared to any other area unless the precipitation, elevation, latitude, and other climate factors are the same.

Recreation

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and

that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 9a and interpretations for dwellings without basements and for local roads and streets in table 8a and 8b.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan

drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Tables 8a and 8b shows the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the susceptibility of the soil to flooding. The resistance of the excavated walls or banks to sloughing or caving is affected by soil texture and moisture content.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. Flooding, shrinking and swelling, and organic layers can cause the movement of footings. Depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They normally have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and frost action potential affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Tables 9a and 9b show the degree and kind of soil limitations that affect septic tank absorption fields, and sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 9b shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site

features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 9a gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in tables 9a and 9b are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Tables 10a and 10b give information about the soils as a source of reclamation material, roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor

processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In tables 10a and 10b, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 11 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties

and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 12.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 12 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074

millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical Properties

Table 13 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 13, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of sand, silt, and clay affects the physical behavior of a soil.

Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification. The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure. Saturated hydraulic conductivity refers to the ability of a soil to transmit water or air.

The term "*permeability*," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil. Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the

soil at various stages of decomposition. In table 13, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 13 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments. Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size. Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 14 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. *Cation-exchange capacity* is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Soil Features

Table 15 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations. A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. Depth to top is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer. For uncoated steel, the risk of corrosion, expressed as low, moderate, or high, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract. For concrete, the risk of corrosion also is expressed as low, moderate, or high. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 16 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations. *Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate

when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission. If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The months in the table indicate the portion of the year in which the feature is most likely to be a concern.

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding. Duration and frequency are estimated. Duration is expressed as extremely brief if 0.1 hour to 4 hours, very brief if 4 hours to 2 days, brief if 2 to 7 days, long if 7 to 30 days, and very long if more than 30 days.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. None means that flooding is not probable; very rare that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); rare that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); occasional that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); frequent that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and very frequent that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development. Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Fluvent (*Fluv*, meaning flood plain sediment, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Torrifluvents (*Torri*, meaning hot and dry, plus *Fluvent*, the suborder of the Entisols that formed in the flood plain sediment).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Torrifluvents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, (calcareous), mesic Typic Torrifluvents.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The Jocity series is an example of the fine-loamy, mixed (calcareous) mesic family of Typic Torrifluvents.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA 1975) and in "Keys to Soil Taxonomy" (USDA 1992). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Anasazi Series

Depth class: moderately deep
Drainage class: well drained
Permeability: moderately rapid
Landform: hills
Parent material: alluvium from limestone
Slope range: 1 to 10 percent

Elevation: 5,000 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: coarse-loamy, mixed, mesic Ustollic Calciorthids

Typical Pedon

Anasazi gravelly loam in an area of Mellenthin-Anasazi complex, 1 to 15 percent slopes, about 16 miles south-southeast of Pipe Spring National Monument; 1,900 feet north and 700 feet east of the southwest corner of section 1, T. 37 N., R. 4 W.

A—0 to 2 inches; brown (7.5YR 5/3) gravelly loam, dark brown (7.5YR 4/2) moist; weak fine granular structure; soft, very friable; common very fine roots; many very fine tubular pores; strongly effervescent; 8 percent calcium carbonate equivalent; 20 percent gravel; slightly alkaline; abrupt smooth boundary.

Bw—2 to 12 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky; many very fine roots; many very fine tubular pores; strongly effervescent (11 percent calcium carbonate equivalent); 15 percent gravel; moderately alkaline; clear broken boundary.

Bk1—12 to 21 inches; light brown (7.5YR 6/4) gravelly loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky; many very fine roots; many very fine tubular pores; violently effervescent (19 percent calcium carbonate equivalent); lime accumulations as common fine soft masses and coatings on some ped faces and undersides of gravel; 20 percent gravel; moderately alkaline; clear wavy boundary.

Bk2—21 to 23 inches; pink (7.5YR 7/4) very gravelly loam, light brown (7.5YR 6/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky; many very fine roots; many very fine tubular pores; violently effervescent (28 percent calcium carbonate equivalent); lime accumulations as few fine soft masses and coatings on undersides of gravel; 35 percent gravel; moderately alkaline; abrupt smooth boundary.

2R—23 inches; limestone

Range in Characteristics

Depth to a calcic horizon: 10 to 20 inches
Depth to bedrock: 20 to 40 inches
Average content of rock fragments in the control section: 15 to 35 percent gravel
Hue: 5YR or 7.5YR
Chroma: 2 to 4

A horizon:
Value—5 or 6, dry; 4 or 5 moist

Bk horizon:
Value—5 through 7, dry; 4 through 6, moist

Bacobi Series

Depth class: moderately deep
Drainage class: well drained
Permeability: moderately slow
Landform: fan terraces
Parent material: alluvium from limestone
Slope range: 1 to 7 percent
Elevation: 4,700 to 5,100 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: fine-loamy, mixed, mesic Typic Haplargids

Typical Pedon

Bacobi sandy loam in an area of Pennell-Bacobi complex, 1 to 7 percent slopes, about 11 miles south of Pipe Spring National Monument; 2,500 feet west and 2,500 feet south of the northeast corner of section 15, T. 38 N., R. 4 W.

A—0 to 2 inches; yellowish red (5YR 4/6) sandy loam, dark reddish brown (5YR 3/4) moist; weak thin platy structure parting to weak fine granular; soft, very friable; common very fine roots; 10 percent gravel; slightly alkaline; abrupt smooth boundary.

Bw—2 to 8 inches; reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, very friable, slightly sticky; few very fine roots; common very fine tubular pores; slightly effervescent; moderately alkaline; clear smooth boundary.

Btk—8 to 10 inches; reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, sticky and plastic; common fine roots; common very fine tubular pores; common distinct clay films on faces of peds and lining pores; slightly effervescent; lime accumulations as few fine masses; moderately alkaline; clear smooth boundary.

Bt1—10 to 13 inches; reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist;

moderate fine and medium subangular blocky structure; slightly hard, firm, sticky and plastic; common fine roots; common very fine tubular pores; common distinct clay films on faces of peds and lining pores; slightly effervescent; moderately alkaline; clear smooth boundary.

Bt2—13 to 20 inches; variegated yellowish red (5YR 5/6) and light reddish brown (5YR 6/4) sandy clay loam, yellowish red (5YR 4/6) and reddish brown (5YR 5/4) moist; weak fine granular and weak fine subangular blocky structure; slightly hard, very friable, slightly sticky; common very fine roots; common very fine tubular pores; few faint clay films on faces of peds; violently effervescent; 40 percent medium and fine lime nodules; strongly alkaline; gradual wavy boundary.

Bk1—20 to 28 inches; light reddish brown (5YR 6/4) sandy clay loam, yellowish red (5YR 5/6 and 5YR 4/6) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky; few very fine roots; common very fine tubular pores; violently effervescent, lime accumulations as common soft masses; common fine lime nodules; strongly alkaline; gradual wavy boundary.

Bk2—28 to 32 inches; light reddish brown (5YR 6/4) sandy loam, yellowish red (5YR 5/6 and 5YR 4/6) moist; weak fine subangular blocky structure; slightly hard, very friable; few very fine roots; common very fine tubular pores; violently effervescent; lime accumulations as common soft masses; few fine lime nodules; strongly alkaline; abrupt smooth boundary.

2Cr—32 inches; thin bedded fractured sandstone; many clay coatings in joints.

Range in Characteristics

Depth to bedrock: 20 to 40 inches
Average content of rock fragments in the control section: 0 to 10 percent
Reaction: moderately or strongly alkaline

A horizon:
Hue—5YR or 7.5YR
Value—4 or 5, dry; 3 or 4, moist
Chroma—4 or 6

B horizon:
Value—5 or 6, dry; 4 or 5, moist
Chroma—4 or 6

Bk horizon:
Calcium carbonate equivalent—15 to 30 percent

Barx Series

Depth class: very deep
Drainage class: well drained
Permeability: moderate
Landform: fan terraces
Parent material: alluvium from sandstone
Slope range: 1 to 8 percent
Elevation: 5,000 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: fine-loamy, mixed, mesic Ustollic Haplargids

Typical Pedon

Barx fine sandy loam, 1 to 5 percent slopes, about 4 miles southeast of Colorado City; 1,600 feet south and 1,800 feet west of the northeast corner of section 2, T. 40 N., R. 7 W.

A1—0 to 2 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist, weak medium platy structure parting to weak fine granular; soft, very friable; many very fine roots; many very fine interstitial pores; 5 percent fine gravel; slightly alkaline; abrupt smooth boundary.

A2—2 to 5 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium platy structure parting to weak fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 5 percent fine gravel; slightly alkaline; abrupt smooth boundary.

Bt1—5 to 8 inches; reddish brown (5YR 5/4) sandy clay loam, yellowish red (5YR 3/5) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots on ped faces; many very fine tubular pores; common, distinct clay films on ped faces and lining pores; 5 percent fine gravel; moderately alkaline; clear smooth boundary.

Bt2—8 to 15 inches; yellowish red (5YR 4/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; very hard, friable, sticky and plastic; common fine roots on ped faces; many fine tubular pores; common distinct clay films on ped faces and lining pores; slightly effervescent; 5 percent fine gravel; moderately alkaline; clear smooth boundary.

Bk1—15 to 28 inches; yellowish red (5YR 4/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to common fine and medium subangular blocky; very hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; slightly effervescent; 5 percent fine gravel; moderately alkaline; clear wavy boundary.

Bk2—28 to 34 inches; variegated pink (5YR 8/3) and yellowish red (5YR 5/6) sandy clay loam, reddish yellow (5YR 6/6) and yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few very fine roots; many fine tubular pores; violently effervescent; lime accumulations as few fine soft masses, many 0.5 to 1 inch diameter lime nodules; moderately alkaline; clear wavy boundary.

Bk3—34 to 50 inches; pink (5YR 8/3) sandy clay loam, pink (5YR 7/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; many fine tubular pores; violently effervescent; common 0.5 to 1 inch diameter lime nodules; 5 percent fine gravel; moderately alkaline; clear wavy boundary.

Bk4—50 to 60 inches; reddish brown (2.5YR 4/4) sandy clay loam, dark reddish brown (2.5YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; violently effervescent; common 0.5 to 1 inch diameter lime nodules; 5 percent fine gravel; moderately alkaline.

Range in Characteristics

Depth to a calcic horizon: 12 to 32 inches
Average content of rock fragments in the control section: 0 to 15 percent
Hue: 5YR and 7.5YR

A horizon:
Texture—loam, fine sandy loam or gravelly loam
Value—4 through 6, dry; 3 through 5, moist
Chroma—3 through 6

Bt horizon:
Value—5 or 6, dry; 3 through 5, moist
Chroma—3 through 6

Buried horizons are present in some pedons.

Begay Series

Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Landform: fan terraces
Parent material: alluvium from sandstone
Slope range: 1 to 12 percent
Elevation: 4,900 to 5,300 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: coarse-loamy, mixed, mesic Ustollic Camborthids

Typical Pedon

Begay fine sandy loam, 1 to 3 percent slopes, about 7 miles northeast of Moccasin; 800 feet east and 500 feet south of the northwest corner of section 8, T. 41 N., R. 3 W.

A—0 to 3 inches; brown (7.5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine granular structure; slightly hard, very friable; many very fine roots; common very fine tubular pores; slightly alkaline; abrupt smooth boundary.

Bw1—3 to 18 inches; reddish brown (5YR 5/4) fine sandy loam, yellowish red (5YR 4/6) moist; moderate fine subangular blocky structure; slightly hard, very friable; many very fine roots; common very fine tubular pores; slightly effervescent; slightly alkaline; clear wavy boundary.

Bw2—18 to 35 inches; reddish brown (5YR 5/4) fine sandy loam, yellowish red (5YR 4/6) moist; weak fine subangular blocky structure; slightly hard, very friable; few very fine roots, common very fine tubular pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C1—35 to 55 inches; reddish brown (5YR 5/4) stratified loamy fine sand, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; few very fine roots; few very fine tubular pores; slightly effervescent; thin discontinuous strata of gravelly loamy sand; slightly alkaline; abrupt smooth boundary.

C2—55 to 60 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; few very fine roots; common very fine tubular pores; slightly effervescent; slightly alkaline.

Range in Characteristics

A horizon:
Hue—2.5YR through 7.5YR
Value—4 or 5, dry and moist
Chroma—4 through 6

Gravelly loamy sand or textures finer than sandy loam are at depths below 40 inches in some pedons

Bidonia Series

Depth class: shallow
Drainage class: well drained
Permeability: slow
Landform: plateaus and mesas
Parent material: alluvium from sandstone
Slope range: 1 to 8 percent
Elevation: 5,000 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: clayey, kaolinitic, mesic Lithic Ustollic Haplargids

Typical Pedon

Bidonia very channery loam in an area of Bidonia-Bond-Rock outcrop complex, 1 to 25 percent slopes, about 5.5 miles southwest of Colorado City; 1,000 feet east and 500 feet north of the southwest corner of section 15, T. 41 N., R. 7 W.

A1—0 to 1 inch; light brown (7.5YR 6/4) very channery loam, dark brown (7.5YR 4/4) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many vesicular pores; 25 percent channers, 10 percent flagstones; slightly alkaline; abrupt smooth boundary.

A2—1 to 3 inches; light brown (7.5YR 6/4) channery fine sandy loam, dark brown (7.5YR 4/4) moist; moderate thin platy structure; slightly hard, friable, sticky and plastic; few very fine roots; many vesicular pores; discontinuous stone line at 3 to 4 inches as horizontally oriented channers; slightly alkaline; abrupt smooth boundary.

Bt1—3 to 10 inches; reddish brown (5YR 5/4) clay, yellowish red (5YR 4/6) moist; moderate coarse prismatic structure parting to moderate fine subangular blocky; hard, very firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; few thin clay films on ped faces and lining pores; slightly alkaline; clear smooth boundary.

Bt2—10 to 14 inches; yellowish red (5YR 4/6) channery clay loam, reddish yellow (5YR 5/4) moist; strong very fine subangular blocky structure; hard, firm, very sticky and very plastic; few fine roots; common very fine tubular pores; slightly effervescent; common distinct clay films on ped faces and lining pores; 30 percent channers; moderately alkaline; abrupt smooth boundary.

2R—14 inches; thin bedded fine grained sandstone; common red (2.5YR 4/6) clay films and lime coatings in fractures.

Range in Characteristics

Depth to bedrock: 10 to 20 inches
Average content of rock fragments in the control section: less than 35 percent

A horizon:
Hue—5YR or 7.5YR
Value—5 or 6, dry; 4 or 5, moist
Chroma—3 through 6, dry or moist

B horizon:
Hue—5YR or 7.5YR
Value—5 or 6 dry, 4 or 5 moist
Chroma—4 through 6, dry or moist

A Bk or Btk horizon is present in some pedons that have less than 15 percent calcium carbonate equivalent.

Bond Series

Depth class: shallow
Drainage class: well drained
Permeability: moderately slow
Landform: plateaus and mesas
Parent material: alluvium from sandstone
Slope range: 1 to 25 percent
Elevation: 5,000 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: loamy, mixed, mesic Lithic Ustollic Haplargids

Typical Pedon

Bond fine sandy loam in an area of Bond-Bidonia complex, 1 to 7 percent slopes, about 4 miles south of Colorado City; 2,700 feet south and 1,700 feet east of the northwest corner of section 21, T. 41 N., R. 7 W.

A—0 to 2 inches; light brown (7.5YR 6/3) fine sandy loam, dark brown (7.5YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky; few very fine roots; many very fine interstitial pores; 5 percent gravel; slightly alkaline; abrupt wavy boundary.

BA—2 to 5 inches; light brown (7.5YR 6/4) fine sandy loam, dark brown (7.5YR 3/3) moist; weak very fine subangular structure; slightly hard, very friable, slightly sticky; few fine roots; many very fine

interstitial pores; 5 percent gravel; slightly alkaline; abrupt wavy boundary.

Bt1—5 to 12 inches; brown (7.5YR 5/4) sandy clay loam, strong brown (7.5YR 4/6) moist; strong fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few faint clay films on faces of peds and lining pores; 5 percent gravel; slightly alkaline; clear wavy boundary.

Bt2—12 to 17 inches; brown (7.5YR 5/4) sandy clay loam, strong brown (7.5YR 4/6) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many very fine tubular pores; few faint clay films on faces of peds and lining pores; 5 percent gravel; moderately alkaline; abrupt smooth boundary.

C—17 to 19 inches; light brown (7.5YR 6/4) sandy clay loam, strong brown (7.5YR 5/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; 10 percent gravel; strongly effervescent; lime is disseminated; moderately alkaline; abrupt smooth boundary.

2R—19 inches; sandstone

Range in Characteristics

Depth to bedrock: 10 to 20 inches
Average content of rock fragments in the control section: less than 35 percent
Calcium carbonate equivalent: less than 15 percent

A horizon:
Texture—fine sandy loam or gravelly sandy loam
Value—5 or 6 dry; 3 or 4 moist
Chroma—3 or 4

Bt horizon:
Hue—5YR or 7.5YR
Value—5 or 6 dry; 4 or 5 moist
Chroma—3 or 4

The C horizon is absent in some pedons.

Some pedons are noncalcareous throughout.

Brinkerhoff Series

Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Landform: fan terraces
Parent material: alluvium from sandstone and gypsiferous shale
Slope range: 0 to 5 percent
Elevation: 4,600 to 5,100 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: coarse-loamy, mixed, mesic Typic Haplargids

Typical Pedon

Brinkerhoff sandy loam, in an area of Brinkerhoff-Grieta complex, 0 to 5 percent slopes, about 16 miles west and 6 miles south of Pipe Spring National Monument; 800 feet south and 400 feet west of the northeast corner of section 23, T. 39 N., R. 7 W.

A1—0 to 1 inch; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; weak thin platy structure parting to weak fine granular; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; 5 percent fine gravel; slightly alkaline; abrupt smooth boundary.

A2—1 to 4 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 3/4) moist; weak thick platy structure parting to weak fine granular; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine tubular pores; 5 percent gravel; slightly alkaline; abrupt smooth boundary.

Bt1—4 to 12 inches; yellowish red (5YR 4/6) sandy loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure parting to common medium subangular blocky; slightly hard, friable, nonsticky and nonplastic; common fine roots; common very fine tubular pores; common faint clay films on faces of peds and lining pores; 5 percent gravel; slightly alkaline; clear wavy boundary.

Bt2—12 to 17 inches; yellowish red (5YR 4/6) sandy loam, reddish brown (5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; common faint clay films on faces of peds and lining pores; 5 percent gravel; moderately alkaline; clear wavy boundary.

Bk—17 to 22 inches; light brown (7.5YR 6/4) loamy sand, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, very friable; few very fine roots; common fine tubular pores; violently effervescent, lime accumulations as few medium soft masses; common large krotovinas; 10 percent gravel; moderate alkaline; clear wavy boundary.

By1—22 to 28 inches; light brown (7.5YR 6/4) loamy sand, strong brown (7.5YR 5/4) moist; massive; slightly hard, very friable; few very fine roots;

violently effervescent; common large krotovinas; few very fine gypsum crystals; 10 percent gravel; moderately alkaline; clear wavy boundary.

2By2—28 to 50 inches; mixed light brown (7.5YR 6/4) and reddish brown (5YR 5/4) gravelly coarse sand, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; few very fine roots; many medium interstitial pores; violently effervescent; many coarse sand size gypsum crystals; 30 percent fine gravel; moderately alkaline; gradual wavy boundary.

2By3—50 to 60 inches; strong brown (7.5YR 5/6) gravelly coarse sand, strong brown (5YR 4/6) moist; massive; loose; strongly effervescent; few coarse sand size gypsum crystals; 15 percent fine gravel; moderately alkaline.

Range in Characteristics

Depth to gypsum: 20 to 30 inches
Average content of rock fragments in the control section: 5 to 30 percent gravel

A horizon:
Hue—5YR or 7.5YR
Value—4 through 6 dry; 4 or 5 moist
Chroma—4 or 6, dry or moist
Reaction—slightly or moderately alkaline

B horizons:
Texture—loamy sand, coarse sand and sandy loam (5 to 40 percent gravel)
Hue—5YR or 7.5YR
Value—4 through 6 dry; 3 through 5 moist
Chroma—4 through 6, dry or moist
Reaction—slightly or moderately alkaline

Campanile Series

Depth class: very deep
Drainage class: well drained
Permeability: slow
Landform: mesas and hills
Parent material: alluvium from shale
Slope range: 1 to 6 percent
Elevation: 4800 to 5500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: fine, mixed, mesic Mollic Torrerts

Typical Pedon

Campanile clay, 1 to 6 percent slopes, about 8 miles northeast of Moccasin; 800 feet north and 200 feet west of the southeast corner of section 22, T. 41 N., R. 4 W.

A1—0 to 2 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; moderate thin platy structure parting to strong very fine angular blocky; extremely hard, very firm, very sticky and very plastic; few very fine roots; many pressure faces; many very fine tubular pores; slightly effervescent, lime disseminated; slightly alkaline; abrupt smooth boundary.

A2—2 to 5 inches; reddish brown 2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; moderate thin platy structure parting to strong very fine angular blocky; extremely hard, very firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; many pressure faces; slightly effervescent; slightly alkaline; abrupt smooth boundary.

ACss—5 to 32 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; strong coarse prismatic structure parting to strong medium and coarse angular blocky; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; many intersecting slickensides; slightly effervescent, lime disseminated; slightly alkaline; gradual wavy boundary.

Ckss—32 to 44 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; strong fine and medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; few slickensides; many pressure faces; slightly effervescent, few fine lime filaments and threads; slightly alkaline; gradual wavy boundary.

Css—44 to 60 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; strong fine and medium subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; few slickensides; many pressure faces; slightly effervescent, lime disseminated; slightly alkaline.

Range in Characteristics

Average content of rock fragments in the control section: 0 to 5 percent gravel
Clay content: 40 to 60 percent
Cracks: 6 to 36 inches apart and 0.5 to 2 inches wide

Reaction: slightly to strongly alkaline

A horizon:
Hue—2.5YR and 5YR
Value—4 or 5 dry, 3 or 4 moist
Chroma—3 or 4, dry or moist

C horizon:
Hue—2.5YR or 5YR
Value—4 or 5 dry, 3 or 4 moist
Chroma—3 or 4, dry or moist

Clayhole Series

Depth class: very deep
Drainage class: well drained
Permeability: moderate
Landform: alluvial fans
Parent material: alluvium from gypsiferous shale
Slope range: 1 to 4 percent
Elevation: 4,400 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: fine-loamy, mixed (calcareous), mesic Typic Torrifluvents

Typical Pedon

Clayhole loam, 1 to 3 percent slopes, about 10 miles east of Moccasin; 200 feet east and 600 feet north of the southwest corner of section 29, T. 40 N., R. 3 W.

A—0 to 2 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4 moist; moderate thin platy structure; slightly hard, very friable, slightly sticky; few very fine roots; common very fine tubular pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

Cy1—2 to 11 inches; yellowish red (5YR 5/6) loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky; few very fine roots; many very fine tubular pores; slightly effervescent; 20 percent gypsum crystals; slightly alkaline; abrupt smooth boundary.

Cy2—11 to 21 inches; yellowish red (5YR 5/6) loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky, few very fine roots; many very fine tubular pores; slightly effervescent; many cicada nodules; 20 percent gypsum crystals; slightly alkaline; abrupt smooth boundary.

Cy3—21 to 60 inches; yellowish red (5YR 5/6) loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; slightly effervescent; 20 percent gypsum crystals; slightly alkaline.

Range in Characteristics

Average content of rock fragments in the control section: less than 15 percent
Hue: 5YR or 7.5YR
Value: 5 or 6 dry; 3 to 5 moist
Chroma: 4 or 6
Texture of the A horizon: loam or silty clay loam

Curhollow Series

Depth class: shallow to hardpan
Drainage class: well drained
Permeability: moderate
Landform: fan terraces
Parent material: alluvium from basalt and limestone
Slope range: 4 to 20 percent
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: loamy-skeletal, mixed, mesic, shallow Ustollic Paleorthids

Typical Pedon

Curhollow gravelly loam in an area of Curhollow-Prieta complex, 4 to 20 percent slopes, about 7 miles northeast of Mount Trumbull; 200 feet east and 700 feet north of the southwest corner of section 20, T. 36 N., R. 7 W.

A—0 to 2 inches; strong brown (7.5YR 4/6) gravelly loam, dark brown (7.5YR 3/3) moist; moderate fine granular structure; slightly hard, very friable; common very fine roots; many very fine tubular pores; slightly effervescent, (5 percent calcium carbonate equivalent); 20 percent gravel; slightly alkaline; clear wavy boundary.

Bw—2 to 5 inches; dark brown (7.5YR 4/4) very gravelly loam, dark brown (7.5YR 4/4) moist; moderate very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; strongly effervescent, (15 percent calcium carbonate equivalent); 40 percent gravel, 10 percent cobble; moderately alkaline; clear wavy boundary.

Bk—5 to 12 inches; brown (7.5YR 5/4) very gravelly loam; dark brown (7.5YR 4/4) moist; moderate fine granular structure; slightly hard, very friable, violently effervescent, (20 percent calcium carbonate equivalent); lime accumulations as few

fine soft masses; 40 percent gravel, 10 percent cobble; moderately alkaline; abrupt smooth boundary.
2Bkm—12 to 22 inches; indurated petrocalcic; abrupt smooth boundary.
3R—22 inches; basalt

Range in Characteristics

Depth to a petrocalcic horizon: 10 to 20 inches
Depth to bedrock: 16 to 36 inches
Average content of rock fragments in the control section: 35 to 65 percent

A horizon:
Value—4 or 5 dry; 3 or 4 moist
Chroma—3 through 6

B horizon:
Value—4 through 6
Chroma—4 or 6

Godding Series

Depth class: very deep
Drainage class: well drained
Permeability: slow
Landform: hills and fan terraces
Parent material: alluvium and colluvium from basalt and pyroclastics
Slope range: 3 to 40 percent
Elevation: 7,200 to 7,500 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 42 to 45 degrees F
Frost-free period: 90 to 120 days
Classification: clayey-skeletal, montmorillonitic Pachic Argiborolls

Typical Pedon

Godding gravelly loam, 3 to 40 percent slopes, on Mount Logan; 2,500 feet north and 1,500 feet west of the southeast corner of section 12; T. 34 N., R. 9 W.

Oi—1 to 1/2 inch; pine needles
Oe—1/2 to 0 inches; slightly decomposed pine litter
A—0 to 5 inches; dark reddish brown (5YR 3/2) gravelly loam, dark reddish brown (5YR 3/2) moist; weak medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few very fine tubular pores; 15 percent gravel; neutral; clear wavy boundary.
Bt1—5 to 12 inches; dark reddish brown (5YR 3/2) gravelly clay loam, dark reddish brown (5YR 3/3) moist; weak very fine subangular blocky structure; hard, firm, sticky and plastic; many medium roots; few very fine tubular pores; few faint clay films on ped faces and lining pores; 15 percent gravel; slightly alkaline; clear wavy boundary.
Bt2—12 to 22 inches; dark reddish brown (5YR 3/2) very cobbly clay, dark reddish brown (5YR 3/3) moist; strong very fine subangular blocky structure; hard, very firm, very sticky and very plastic; many medium roots; few very fine tubular pores; common faint clay films on ped faces and lining pores; 40 percent cobble, 15 percent gravel; slightly alkaline; clear wavy boundary.
Bt3—22 to 34 inches; dark reddish brown (5YR 3/3) very cobbly clay, dark reddish brown (2.5YR 3/4) moist; strong very fine subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; few very fine tubular pores; many distinct clay films on ped faces and lining pores; 30 percent cobble, 15 percent gravel; slightly alkaline; clear wavy boundary.
Bt4—34 to 41 inches; dark reddish brown (5YR 3/4) very cobbly clay, dark reddish brown (2.5YR 3/4) moist; strong very fine subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; few very fine tubular pores; many distinct clay films on ped faces and lining pores; 30 percent cobble, 15 percent gravel; slightly alkaline; clear wavy boundary.
Bt5—41 to 60 inches; dark reddish brown (5YR 3/4) very cobbly clay loam, dark reddish brown (5YR 3/3) moist; strong fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine tubular pores; few faint clay films on ped faces and lining pores; 30 percent cobble, 15 percent gravel; slightly alkaline.

Range in Characteristics

Average content of rock fragments in the control section: 35 to 65 percent
Clay content: 35 to 50 percent

A horizon:
Hue—5YR or 7.5YR
Value—3 or 4 dry; 2 or 3 moist
Chroma—1 through 3

B horizon:
Hue—5YR or 7.5YR
Value—3 or 4 dry or moist
Chroma—2 through 4

A C horizon is present in some pedons.

Some pedons are calcareous in the lower part.

Goesling Series

Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Landform: stream terraces
Parent material: alluvium from limestone
Slope range: 1 to 5 percent
Elevation: 5,800 to 6,200 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days
Classification: fine-loamy, mixed, mesic Aridic Haplustalfs

Typical Pedon

Goesling loam in an area of Yumtheska-Goesling complex, 1 to 15 percent slopes, about 13 miles east of Mt. Trumbull; 1,900 feet east and 200 feet south of the northwest corner of section 24, T. 35 N., R. 6 W.

A—0 to 4 inches; dark brown (7.5YR 4/4) loam, dark brown (7.5YR 3/3) moist; weak fine granular structure; slightly hard, very friable; many very fine roots; slightly effervescent; 5 percent gravel; slightly alkaline; clear wavy boundary.

Bt1—4 to 8 inches; dark brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; few faint clay films on ped faces and lining pores; strongly effervescent; 5 percent gravel; slightly alkaline; clear wavy boundary.

Bt2—8 to 16 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; strong fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; common faint clay films on ped faces and lining pores; strongly effervescent; 5 percent gravel; moderately alkaline; clear wavy boundary.

Bk1—16 to 24 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine tubular pores; violently effervescent; lime accumulations as few fine soft masses; 5 percent gravel; moderately alkaline; clear wavy boundary.

Bk2—24 to 32 inches; light brown (7.5YR 6/3) loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; violently effervescent; lime accumulations as few fine soft masses; 5 percent gravel; moderately alkaline; clear wavy boundary.

B—32 to 41 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; strongly effervescent; 5 percent gravel; moderately alkaline; clear wavy boundary.

C—41 to 60 inches; light brown (7.5YR 6/3) loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; slightly effervescent; 5 percent gravel; moderately alkaline.

Range in Characteristics

Depth to a calcic horizon: 15 to 26 inches
Average content of rock fragments in the control section: less than 5 percent
Clay content: 18 to 35 percent

A and Bt Horizons:
Value—4 or 5 dry; 3 or 4 moist
Chroma—3 or 4

Bk horizon:
Value—5 or 6 dry; 4 or 5 moist
Chroma—3 or 4

Some pedons are noncalcareous above the Bk horizon.

Grieta Series

Depth class: very deep
Drainage class: well drained
Permeability: moderate
Landform: fan terraces
Parent material: alluvium from sandstone
Slope range: 1 to 5 percent
Elevation: 4,600 to 5,100 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: fine-loamy, mixed, mesic Typic Haplargids

Typical Pedon

Grieta loam, in an area of Kinan-Hatknoll-Grieta complex, 1 to 5 percent slopes, about 21 miles south of Colorado City; 1,500 feet east and 2,100 feet north of the southwest corner of section 32, T. 38 N., R. 7 W.

A—0 to 3 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; slightly hard, very friable; common fine roots; few very fine tubular pores; 1 percent gravel; slightly alkaline; abrupt smooth boundary.

Bt—3 to 21 inches; dark brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common very fine tubular pores; few faint clay films on ped faces and lining pores; 1 percent gravel; slightly alkaline; clear wavy boundary.

Btk—21 to 25 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common very fine tubular pores; few faint clay films on ped faces and lining pores; strongly effervescent, (12 percent calcium carbonate equivalent); lime accumulations as few fine soft masses; many cicada nodules; 1 percent gravel; moderately alkaline; clear wavy boundary.

Bk1—25 to 36 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common very fine tubular pores; violently effervescent, (24 percent calcium carbonate equivalent); lime disseminated; many cicada nodules; 1 percent gravel; moderately alkaline; clear wavy boundary.

Bk2—36 to 60 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; 1 percent gravel; violently effervescent; lime accumulations as few soft masses; moderately alkaline.

Range in Characteristics

Depth to a calcic horizon: 20 to 40 inches
Average content of rock fragments in the control section: less than 10 percent
Clay content: 18 to 35 percent
Hue: 5YR or 7.5YR

A horizon:
Value—4 or 5 dry; 3 or 4 moist
Chroma—3 or 4

Btk horizon:
Value—5 or 6 dry; 4 or 5 moist
Chroma—4 or 6

Gypsiorthids

Depth class: very shallow to very deep
Drainage class: well drained
Permeability: moderately rapid
Landform: fan terraces and hills
Parent material: alluvium from gypsiferous shale
Slope range: 1 to 50 percent
Elevation: 4,400 to 5,000 feet
Average annual precipitation: 6 to 10 inches
Average annual air temperature: 55 to 57 degrees F
Frost-free season: 165 to 180 days
Classification: Gypsiorthids

Reference Pedon

Reference pedon of Gypsiorthids in an area of Gypsiorthids-Gypsiorthids, shallow complex, 1 to 50 percent slopes; about 4 miles southeast of Moccasin; about 1600 feet north and 1800 feet east of the southwest corner of section 12, T. 40 N., R. 3 W. (fig. 11)

A—0 to 2 inches; brown (10YR 5/4) silt loam, dark brown (7.5YR 4/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few very fine tubular pores; few 1/16 to 1/4 inch strata of weak discontinuous horizontally oriented brittle cemented gypsum pan material; strongly effervescent; moderately alkaline; abrupt smooth boundary.

By—2 to 13 inches; very pale brown (7.5YR 7/4) coarse sandy loam, pale brown (10YR 6/3) moist; strong coarse granular structure; slightly hard, very friable, nonsticky and nonplastic; common medium roots; few very fine tubular pores; vertical gypsum crystalline growth is common at 13 inches; 30 percent visible gypsum; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C1—13 to 31 inches; light brownish gray (2.5Y 6/3) loamy coarse sand, grayish brown (2.5Y 5/3) moist; strong medium granular structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine tubular pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C2—31 to 60 inches; light brownish gray (2.5Y 6/2) coarse sandy loam, grayish brown (2.5Y 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; cemented extremely hard flag size pan fragments,

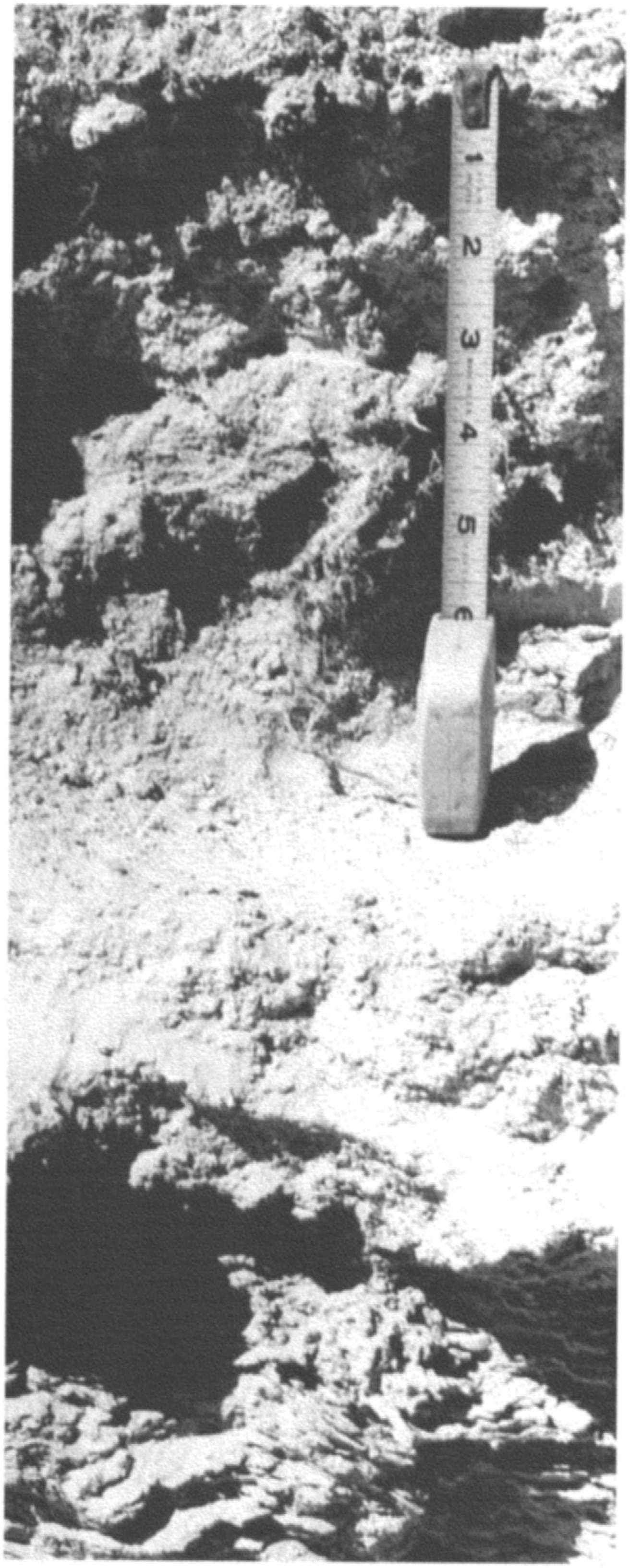

Figure 11.—Profile of Gypsiorthids-Gypsiorthids, shallow complex, 1 to 50 percent slopes, with weathered gypsum bedrock at 8 inches.

2 to 8 inches apart; few areas of honeycombed gypsum under some gypsum flags; slightly effervescent; slightly alkaline.

Range in Characteristics

Reaction—slightly to moderately alkaline
Depth to a weathered bedrock—4 to more than 60 inches

A horizon:
Texture—sandy loam, loam or silt loam
Hue—5YR, 7.5YR, 10YR or 2.5Y
Value—5 through 7
Chroma—3 through 6

Hatknoll Series

Depth class: very deep
Drainage class: well drained
Permeability: slow
Landform: fan terraces
Parent material: alluvium from basalt and pyroclastics
Slope range: 1 to 10 percent
Elevation: 4,700 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: fine, montmorillonitic, mesic Typic Haplargids

Typical Pedon

Hatknoll silty clay loam in an area of Kinan-Hatknoll-Grieta complex, 1 to 5 percent slopes, 19 miles south of Colorado City; 1,000 feet south and 300 feet east of the northwest corner of section 33, T. 38 N., R. 7 W.

A—0 to 3 inches; dark brown (7.5YR 4/3) silty clay loam, dark brown (7.5YR 3/4) moist; weak thin platy structure; hard, firm, sticky and plastic; common very fine roots; few very fine tubular pores; 5 percent gravel; moderately alkaline; abrupt smooth boundary.

Bt1—3 to 12 inches; dark brown (7.5YR 4/4) silty clay, dark brown (7.5YR 3/4) moist; strong fine prismatic structure parting to strong fine subangular blocky; very hard, firm, very sticky and very plastic; common very fine roots; many very fine tubular pores; common faint clay films on ped faces and lining pores; 5 percent gravel; moderately alkaline; clear wavy boundary.

Bt2—12 to 20 inches; dark brown (7.5YR 4/4) silty clay, dark brown (7.5YR 3/4) moist; strong fine prismatic structure parting to strong fine subangular blocky; very hard, firm, very sticky and very plastic; common very fine roots; many very

fine tubular pores; common distinct clay films on ped faces and lining pores; 5 percent gravel; moderately alkaline; clear wavy boundary.

Bt3—20 to 25 inches; reddish brown (5YR 4/4) gravelly silty clay, reddish brown (5YR 4/4) moist; strong fine subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; common distinct clay films on ped faces and lining pores; 20 percent gravel; moderately alkaline; clear wavy boundary.

2Bk1—25 to 36 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; moderate fine subangular blocky structure with discontinuous areas of weak thin platy; very hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; violently effervescent; lime accumulations as few fine soft masses; moderately alkaline; clear wavy boundary.

2B—36 to 60 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure with discontinuous areas of weak thin platy; very hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; violently effervescent; lime disseminated; moderately alkaline.

Range in Characteristics

Depth to a calcic horizon: 20 to 30 inches
Average content of rock fragments in the control section: less than 15 percent
Hue: 5YR or 7.5YR
Value: 4 through 6 dry; 3 through 5 moist
Chroma of the A horizon: 3 or 4
Chroma of the B horizon: 4 or 6

Havasupai Series

Depth class: shallow to hardpan
Drainage class: well drained
Permeability: moderate
Landform: fan terraces
Parent material: alluvium from limestone
Slope range: 2 to 8 percent
Elevation: 4,800 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: loamy-skeletal, mixed, mesic, shallow Ustollic Paleorthids

Typical Pedon

Havasupai very gravelly loam in an area of Havasupai-Mellenthin complex, 2 to 12 percent slopes, about 27 miles south-southwest of Pipe Spring National Monument; 1,400 feet north and 800 feet west of the southeast corner of section 36, T.36 N., R. 6 W.

A—0 to 2 inches; brown (7.5YR 5/3) very gravelly loam, dark brown (7.5YR 3/3) moist; weak thin platy structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; strongly effervescent; 35 percent gravel; slightly alkaline; abrupt smooth boundary.

Bk1—2 to 9 inches; brown (7.5YR 5/3) gravelly loam, dark brown (7.5YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; violently effervescent; 20 percent gravel, 5 percent cobble; lime accumulations as thin lime coatings on undersides of gravel; moderately alkaline; clear wavy boundary.

Bk2—9 to 17 inches; brown (7.5YR 5/3) extremely gravelly loam, dark brown (7.5YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; violently effervescent; 65 percent gravel, 5 percent cobble; moderately alkaline; abrupt smooth boundary.

Bkm—17 to 35 inches; laminar capped, lime cemented hardpan, abrupt wavy boundary.

2C—35 to 60 inches; light brown (7.5YR 6/4) extremely gravelly sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable; few fine tubular pores; violently effervescent; 50 percent gravel, 20 percent cobble; moderately alkaline.

Range in Characteristics

Depth to a petrocalcic horizon: 10 to 20 inches

A horizon:
Value—5 or 6 dry; 3 or 4 moist
Chroma—2 through 4

B horizon:
Value—5 through 8 dry; 4 or 5 moist
Chroma—3 through 5

Jocity Series

Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Landform: flood plains and stream terraces
Parent material: mixed alluvium

Slope range: 1 to 4 percent
Elevation: 4,400 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: fine-loamy, mixed (calcareous), mesic Typic Torrifluvents

Typical Pedon

Jocity silty clay loam, 1 to 4 percent slopes; about 5 miles southeast of Moccasin; 2,000 feet south, 2,200 feet west of the northeast corner of section 3, T. 40 N., R. 3 W. (fig. 12)

A—0 to 3 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; moderate very thin platy structure; hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C1—3 to 4 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C2—4 to 11 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; weak thin platy structure parting to strong fine subangular blocky; very hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C3—11 to 15 inches; yellowish red (5YR 5/6) fine sandy loam, reddish brown (5YR 4/4) moist; weak thin platy structure, slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C4—15 to 33 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; weak thin platy structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; common strata of finer and coarser textures; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C5—33 to 60 inches; reddish brown (5YR 5/4) fine sandy loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; common strata of finer and coarser textures; slightly effervescent; slightly alkaline.

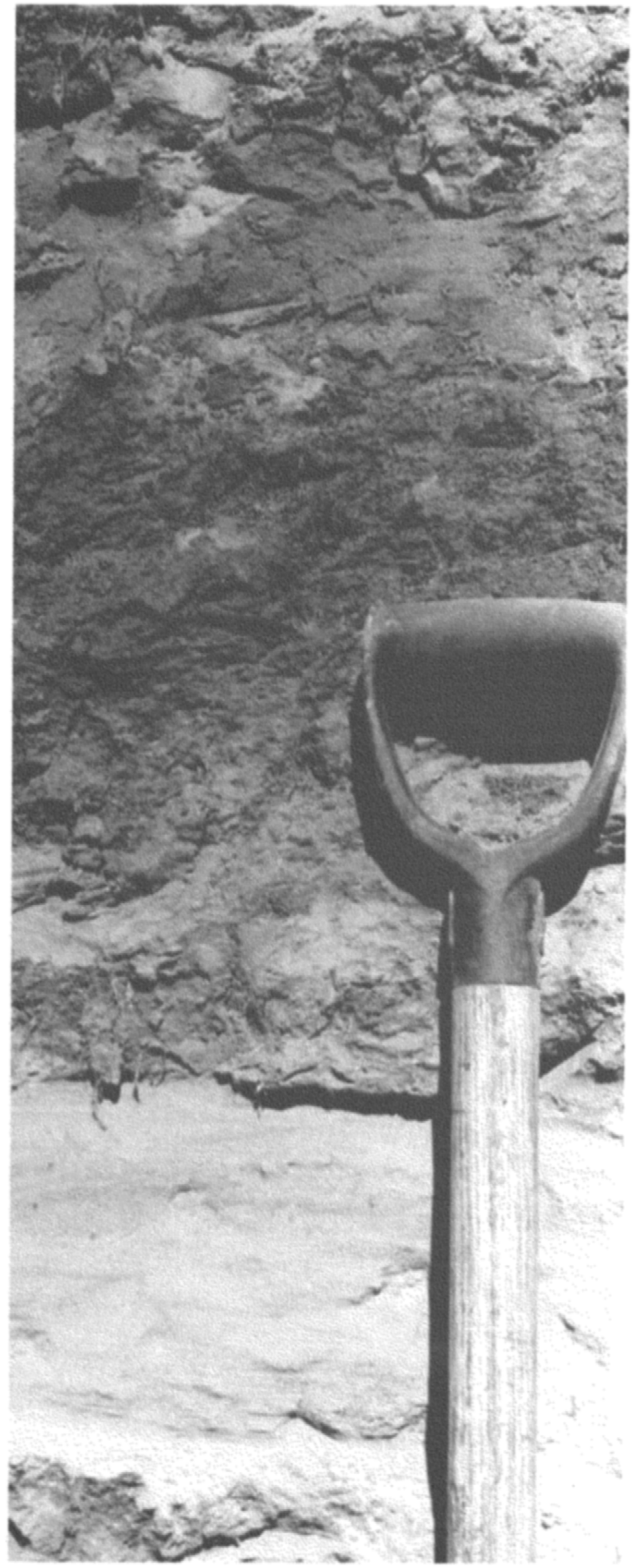

Figure 12.—Profile of Jocity clay loam, 1 to 4 percent slopes, flooded. Strata of contrasting textures are common.

Range in Characteristics

Reaction: slightly to moderately alkaline
Carbonates: slightly to strongly effervescent
Hue: 5YR or 7.5YR
Value: 4 through 6 dry; 3 through 5 moist
Chroma: 4 through 6, dry and moist

Kinan Series

Depth class: very deep
Drainage class: well drained
Permeability: moderate
Landform: fan terraces
Parent material: alluvium from limestone
Slope range: 1 to 15 percent
Elevation: 4,700 to 5,100 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: coarse-loamy, mixed, mesic Typic Calciorthids

Typical Pedon

Kinan loam in an area of Kinan-Hatknoll-Grieta complex, 1 to 5 percent slopes, about 14 miles south-southwest of Pipe Spring National Monument 1,600 feet west and 1,500 feet south of the northeast corner of section 22, T. 38 N., R. 5 W.

A—0 to 2 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak thin play structure parting to weak fine granular; soft, very friable, slightly sticky; few very fine roots; many fine interstitial pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

BA—2 to 7 inches; brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; weak thin platy structure parting to weak fine subangular blocky; slightly hard, very firm, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; strongly effervescent; 5 percent gravel; moderately alkaline; clear smooth boundary.

Bw—7 to 14 inches; yellowish red (5YR 5/6) gravelly loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, very firm, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; violently effervescent; 10 percent fine nodules; 30 percent gravel; moderately alkaline; clear wavy boundary.

Bk1—14 to 28 inches; pink (5YR 7/4) loam, yellowish red (5YR 5/6) moist; massive; hard, very firm, slightly sticky; common very fine roots; many very fine tubular pores; violently effervescent; lime accumulations as few fine soft masses; 60 percent fine and medium nodules; 10 percent gravel; moderately alkaline; gradual wavy boundary.

Bk2—28 to 44 inches; light reddish brown (5YR 6/4) loam, yellowish red (5YR 5/6) moist; massive; slightly hard, very firm, slightly sticky; few very fine pores; many very fine tubular pores; violently effervescent; lime accumulations as many soft masses; 30 percent fine nodules; 5 percent gravel; moderately alkaline; gradual irregular boundary.

2Bk—44 to 51 inches; yellowish red (5YR 5/6) channery loam, yellowish red (5YR 4/6 and 5/6) moist; weak fine and medium subangular block structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine and fine tubular pores; violently effervescent; lime accumulations as many soft masses and coatings on rock fragments; 5 percent flagstones and 20 percent channers; moderately alkaline; gradual wavy boundary.

2Btyb—51 to 60 inches; reddish brown (2.5YR 5/4) very channery sandy clay loam, dark reddish brown (2.5YR 3/5) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; slightly effervescent; common masses of gypsum crystals; lime accumulations as coatings on undersides of rock fragments; 5 percent flagstones and 40 percent channers; slightly alkaline.

Range in Characteristics

Depth to a calcic horizon: 8 to 25 inches
Average content of rock fragments in the control section: 5 to 35 percent (individual horizons range to 55 percent)
Hue: 5YR or 7.5YR (buried horizon 2.5YR)

A horizon:
Texture—loam or gravelly loam
Value—4 or 5 dry; 3 or 4 moist
Chroma—4 or 6

Bw horizon:
Value—4 or 5 dry; 3 or 4 moist
Chroma—4 or 6

Bk horizon:
Value—5, 6, or 7 dry; 3 through 5 moist
Chroma—4 or 6

Some pedons do not have buried horizons and/or gypsum.

Klondike Series

Depth class: shallow

Drainage class: well drained
Permeability: moderately slow
Landform: hills
Parent material: alluvium from sandstone and shale
Slope range: 2 to 15 percent
Elevation: 4,800 to 5,000 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents

Typical Pedon

Klondike sandy clay loam, 2 to 15 percent slopes, about 10 miles east-southeast of Pipe Spring National Monument; 2,300 feet and 2,500 feet west of the southeast corner of section 25, T. 40 N., R. 2 W.

A—0 to 2 inches; reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; slightly effervescent; 5 percent channers; slightly alkaline; abrupt smooth boundary.

Bw1—2 to 8 inches; reddish brown (2.5YR 4/4) clay loam, dark reddish brown (2.5YR 3/4) moist; strong fine granular structure; hard, firm, sticky and plastic; common fine roots; common fine tubular pores; slightly effervescent; 10 percent channers; slightly alkaline; clear wavy boundary.

Bw2—8 to 11 inches; reddish brown (5YR 4/4) loam, dark reddish brown (2.5YR 3/4) moist; moderate very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine tubular pores; slightly effervescent; 10 percent channers; slightly alkaline; abrupt smooth boundary.

2Cr—11 inches; fractured sandstone.

Range in Characteristics

Depth to bedrock: 10 to 20 inches
Average content of rock fragments in the control section: 0 to 35 percent gravel or channers
Gypsum content: 0 to 5 percent
Hue: 2.5YR or 5YR

A horizon:
Value—4 through 6 dry; 3 or 4 moist
Chroma—3 or 4

Bw horizon:
Value—4 or 5 dry; 3 or 4 moist
Chroma—4 or 6
Calcium carbonate equivalent—less than 15 percent
Effervescence—slight to violent

Lomaki Series

Depth class: very deep (moderately deep to cinders)
Drainage class: somewhat excessively drained
Permeability: moderate
Landform: cinder cones
Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Slope range: 15 to 50 percent
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: loamy-skeletal over fragmental, mixed, mesic Vitrustandic Camborthids

Typical Pedon

Lomaki extremely gravelly loam, in an area of Wukoki-Lomaki complex, 15 to 50 percent slopes, about 11 miles north of Mount Trumbull; 700 feet east and 2,000 feet south of the northwest corner of section 23, T. 37 N., R. 8 W.

A—0 to 2 inches; yellowish brown (10YR 5/4) extremely gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, very friable; many very fine roots; many very fine tubular pores; 70 percent cinders; slightly alkaline; abrupt smooth boundary.

Bw—2 to 14 inches; yellowish brown (10YR 5/4) extremely gravelly loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable; common very fine roots; common very fine tubular pores; 65 percent cinders; slightly alkaline; clear wavy boundary.

Bk—14 to 30 inches; yellowish brown (10YR 5/4) extremely gravelly loam , dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable; common fine roots; common very fine pores; slightly effervescent; 65 percent cinders; moderately alkaline; abrupt wavy boundary.

2C—30 to 60 inches; black cinders; few very fine roots.

Range in Characteristics

Depth to a cinders: 20 to 40 inches
Average content of rock fragments in the control section: 60 to 75 percent cinders
Hue: 7.5YR or 10YR
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 3 or 4

B horizon:
Effervescence—noneffervescent to slight

The surface is covered by 65 to 100 percent cinders.

Some pedons have a layer of cinders of up to 2 inches thick on the surface.

Lozinta Series

Depth class: very deep (moderately deep to cinders)
Drainage class: somewhat excessively drained
Permeability: moderate
Landform: cinder cones and fan terraces
Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Slope range: 1 to 50 percent
Elevation: 5,800 to 7,200 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days
Classification: loamy-skeletal over fragmental, mixed, mesic Vitrandic Ustochrepts

Typical Pedon

Lozinta extremely gravelly loam in an area of Wutoma-Lozinta complex, 15 to 50 percent slopes, about 6 miles east of Mount Trumbull; 1,700 feet west and 1,600 feet south of the northeast corner of section 20, T 34 N., R. 8 W.

A—0 to 2 inches; dark brown (10YR 4/3) extremely gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable; many very fine roots; many very fine tubular pores; 70 percent cinders; neutral; abrupt smooth boundary.

Bw1—2 to 10 inches; dark brown (10YR 4/3) extremely gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable; many fine roots; many very fine tubular pores; 70 percent cinders; slightly alkaline; clear wavy boundary.

Bw2—10 to 24 inches; brown (10YR 5/3) extremely gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable; few fine roots; many very fine tubular pores; 70 percent cinders; slightly alkaline; abrupt irregular boundary.

2C—24 to 60 inches; black cinders; few very fine roots.

Range in Characteristics

Depth to cinders: 20 to 40 inches
Average content of rock fragments in the control section: 65 to 75 percent cinders
Hue: 7.5YR or 10YR

A horizon:
Value—4 or 5 dry; 3 or 4 moist
Reaction—neutral or slightly alkaline

B horizon:
Reaction—neutral to moderately alkaline

The surface is covered by 65 to 100 percent cinders.

Some pedons have a cinder lag up to 2 inches thick.

Some pedons have few fine lime veins and filaments in the lower B horizon.

Manikan Series

Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Landform: stream terraces
Parent material: alluvium from sandstone and shale
Slope range: 1 to 4 percent
Elevation: 4,900 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents

Typical Pedon

Manikan silty clay loam, 1 to 4 percent slopes about 30 miles south of Colorado City; 400 feet east and 1,800 feet south of the northwest corner of section 21, T. 36 N., R. 6 W.

A—0 to 4 inches; brown (7.5YR 5/4) silty clay loam, dark brown (7.5YR 4/3) moist; moderate thin platy structure; hard, firm, sticky and plastic; common fine roots; common fine tubular pores; strongly effervescent (12 percent calcium carbonate equivalent); slightly alkaline; abrupt smooth boundary.

C—4 to 23 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 4/3) moist; weak coarse prismatic structure parting to moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; many very fine tubular pores; strongly effervescent, (12 percent calcium carbonate equivalent); slightly alkaline; abrupt smooth boundary.

Ck1—23 to 34 inches; brown (7.5YR 5/4) loam, dark

brown (7.5YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; many very fine tubular pores; strongly effervescent, (12 percent calcium carbonate equivalent); lime accumulations as few fine filaments and threads; moderately alkaline; abrupt smooth boundary.

Ck2—34 to 46 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; strongly effervescent, (12 percent calcium carbonate equivalent); lime accumulations as few fine filaments and threads; moderately alkaline; abrupt smooth boundary.

C—46 to 60 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; strongly effervescent, (12 percent calcium carbonate equivalent); moderately alkaline.

Range in Characteristics

Texture in the control section: ranges to clay loam
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 3 or 4
Reaction (A and C horizons): slightly or moderately alkaline

Mellenthin Series

Depth class: shallow
Drainage class: well drained
Permeability: moderate
Landform: hills
Parent material: alluvium from limestone
Slope range: 1 to 50 percent
Elevation: 4,400 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: loamy-skeletal, mixed, mesic Lithic Ustollic Calciorthids

Typical Pedon

Mellenthin very gravelly loam in an area of Havasupai-Mellenthin complex, 2 to 12 percent slopes, about 12 miles east-northeast of Pipe Spring National Monument; 1,600 feet west and 1,800 feet north of the southeast corner of section 21, T. 40 N., R. 2 W.

A—0 to 2 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; slightly hard, very friable; few very fine roots; few very fine tubular pores; 25 percent gravel and 10 percent cobble; strongly effervescent, (15 percent calcium carbonate equivalent); lime is disseminated; slightly alkaline; clear wavy boundary.

Bw—2 to 8 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable; few very fine roots; few very fine tubular pores; 30 percent gravel and 10 percent cobble; violently effervescent, (24 percent calcium carbonate equivalent); lime is disseminated; moderately alkaline; clear wavy boundary.

Bk—8 to 15 inches; light brown (7.5YR 6/4) very gravelly loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; slightly hard, very friable; few very fine roots; few very fine tubular pores; violently effervescent, (30 percent calcium carbonate equivalent); lime accumulations as 0.25 to 0.50 inch thick pendants on undersides of cobble; 40 percent lime-coated gravel, 15 percent cobble; moderately alkaline; abrupt smooth boundary.

2R—15 inches; fractured limestone.

Range in Characteristics

Depth to bedrock: 10 to 20 inches
Average content of rock fragments in the control section: 35 to 65 percent
Hue: 5YR or 7.5YR

A horizon:
Texture—gravelly loam, very gravelly loam, gravelly sandy loam
Value—5 or 6 dry; 4 or 5 moist
Chroma—4 or 5

Bk horizon:
Value—6,7, or 8 dry; 4 or 5 moist
Chroma—4, 5, or 6
Calcium carbonate equivalent—15 to 35 percent

Bw horizon is absent in some pedons.

Mido Series

Depth class: very deep
Drainage class: excessively drained
Permeability: rapid
Landform: fan terraces
Parent material: alluvium and eolian material from sandstone
Slope range: 1 to 10 percent

Elevation: 4,900 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: mixed, mesic Ustic Torripsamments

Typical Pedon

Mido fine sand, 1 to 10 percent slopes, about 3 miles south of Colorado City; 1,200 feet east and 50 feet north of the southwest corner of section 13, T. 41 N., R. 7 W.

A1—0 to 2 inches; reddish yellow (7.5YR 6/6) fine sand, dark brown (7.5YR 4/4) moist; single grain; soft, loose; few very fine roots; slightly effervescent; slightly alkaline; abrupt smooth boundary.

A2—2 to 5 inches; strong brown (7.5YR 5/6) fine sand, dark brown (7.5YR 4/4) moist; single grain; loose; few very fine roots; few very fine tubular pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

Bw1—5 to 9 inches; strong brown (7.5YR 5/6) fine sand, yellowish red, (5YR 4/6) moist; weak coarse subangular blocky structure; slightly hard, very friable; few fine coarse roots; few fine tubular pores; common faint clay bridging mineral grains on vertical ped faces; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw2—9 to 18 inches; strong brown (7.5YR 5/6) fine sand, yellowish red, (5YR 4/6) moist; weak coarse subangular blocky structure; slightly hard, very friable; few fine coarse roots; few fine tubular pores; few faint clay bridging mineral grains on vertical ped faces; noneffervescent; moderately alkaline; clear smooth boundary.

C1—18 to 33 inches; strong brown (7.5YR 5/6) fine sand, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; many very fine roots; few fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—33 to 46 inches; reddish yellow (5YR 6/6) very fine sand, yellowish red (5YR 5/6) moist; massive; slightly hard, very friable; few very fine roots; few very fine tubular pores; lime accumulations as few filaments; strongly effervescent; moderately alkaline; clear smooth boundary.

C3—46 to 60 inches; reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6) moist; massive; slightly hard, very friable; few very fine roots; few very fine tubular pores; slightly effervescent; moderately alkaline.

Range in Characteristics

Hue: 5YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 4 or 6

Some pedons are noneffervescent throughout.

The Bw horizon is absent in some pedons.

Milok Series

Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Landform: fan terraces
Parent material: alluvium from limestone
Slope range: 1 to 15 percent
Elevation: 5,000 to 5,600 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: coarse-loamy, mixed, mesic Ustollic Calciorthids

Typical Pedon

Milok gravelly loam, 1 to 15 percent slopes, about 5 miles northeast of Mount Trumbull; 800 feet east and 1,600 feet south of the northwest corner of section 3, T. 35 N., R. 7 W.

A—0 to 3 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; slightly hard, very friable; common very fine roots; many very fine tubular pores; slightly effervescent; 20 percent gravel; moderately alkaline; clear wavy boundary.

Bw—3 to 11 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable; common very fine roots; many very fine tubular pores; strongly effervescent; 5 percent gravel; moderately alkaline; gradual wavy boundary.

Bk1—11 to 30 inches; light brown (7.5YR 6/4) sandy loam, light brown (7.5YR 6/4) moist; moderate fine subangular blocky structure; slightly hard, very friable; common very fine roots; many very fine tubular pores; violently effervescent; lime accumulations as common fine soft masses; 5 percent gravel; strongly alkaline; gradual wavy boundary.

2C—30 to 60 inches; reddish brown (5YR 5/4) gravelly sandy loam, reddish brown (5YR 4/4) moist;

massive; slightly hard, very friable; few very fine roots; many very fine tubular pores; slightly effervescent; 30 percent gravel; strongly alkaline.

Range in Characteristics

Depth to a calcic horizon: 8 to 20 inches
Average content of rock fragments in the control section: less than 15 percent (ranges as high as 30 percent in some horizons)
Hue: 5YR or 7.5YR

A and Bw Horizons:
Value—5 or 6 dry; 4 or 5 moist
Chroma—4 or 6

Bk horizon:
Value—5 through 8 dry; 4 through 6 moist
Chroma—3 through 6

Moab Series

Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Landform: fan terraces
Parent material: alluvium from limestone
Slope range: 1 to 20 percent
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: loamy-skeletal, carbonatic, mesic Ustollic Calciorthids

Typical Pedon

Moab gravelly loam in an area of Poley-Moab complex, 1 to 10 percent slopes, about 13 miles north of Mount Trumbull; 2,500 feet north and 700 feet west of southeast corner of section 28, T. 37 N., R. 8 W.

A—0 to 2 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 4/2) moist; weak thin platy structure; slightly hard, very friable; few very fine roots; common very fine pores; slightly effervescent, (5 percent calcium carbonate equivalent); 20 percent gravel; slightly alkaline; abrupt smooth boundary.

Bw—2 to 6 inches; brown (7.5YR 5/3) very gravelly loam, dark brown (7.5YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, very friable; few fine roots; common very fine tubular pores; slightly effervescent, (8 percent calcium carbonate equivalent); 40 percent gravel; lime accumulations as coatings on undersides of gravel; moderately alkaline; clear wavy boundary.

Bk1—6 to 11 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common very fine tubular pores; violently effervescent, (20 percent calcium carbonate equivalent); 35 percent gravel; lime accumulations as coatings on gravel; discontinuous weakly cemented areas; moderately alkaline; clear wavy boundary.

Bk2—11 to 24 inches; pinkish white (7.5YR 8/2) very gravelly loam, pinkish white (7.5YR 6/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common very fine tubular pores; violently effervescent, (48 percent calcium carbonate equivalent); 35 percent gravel; lime accumulations as coatings on gravel; discontinuous weakly cemented areas; moderately alkaline; gradual wavy boundary.

Bk3—24 to 38 inches; pinkish gray (7.5YR 7/2) very gravelly loam, brown (7.5YR 5/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common very fine tubular pores; violently effervescent, (45 percent calcium carbonate equivalent); 40 percent gravel; lime accumulations as coatings on gravel; moderately alkaline; gradual wavy boundary.

Bk4—38 to 60 inches; brown (7.5YR 5/3) very gravelly loam, dark brown (7.5YR 4/3) moist; massive; slightly hard, very friable; few fine roots; common very fine tubular pores; violently effervescent, (25 percent calcium carbonate equivalent); 40 percent gravel; moderately alkaline.

Range in Characteristics

Depth to a calcic horizon: 6 to 20 inches
Calcium carbonate equivalent: 40 to 60 percent
Average content of rock fragments in the control section: 35 to 65 percent gravel and cobble

A horizon:
Texture—loam or gravelly loam
Value—4 through 6 dry and moist
Chroma—3 or 4

Bw horizon:
Value—4 through 6 dry; 4 or 5 moist
Chroma—4 or 6

Bk horizon:

Value—6 through 8 dry; 4 or 5 moist
Chroma—2, 3 or 4

Monue Series

Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Landform: fan terraces
Parent material: alluvium from sandstone
Slope range: 1 to 5 percent
Elevation: 4,700 to 4,900 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: coarse-loamy, mixed, mesic Typic Camborthids

Typical Pedon

Monue fine sandy loam, 1 to 5 percent slopes, about 2 miles west-southwest of Pipe Spring National Monument; 1,200 feet east and 400 feet north of the southwest corner of section 24, T. 40 N., R. 5 W.

A1—0 to 2 inches; yellowish red (5YR 4/6) fine sandy loam, reddish brown (5YR 4/4) moist; single grain; loose; few very fine roots; common very fine interstitial pores; slightly effervescent, (5 percent calcium carbonate equivalent); slightly alkaline; abrupt smooth boundary.

A2—2 to 5 inches; yellowish red (5YR 4/6) fine sandy loam, reddish brown (5YR 4/4) moist; weak thick platy structure; slightly hard, very friable; common very fine roots; many very fine tubular pores; slightly effervescent, (5 percent calcium carbonate equivalent); slightly alkaline; abrupt smooth boundary.

Bw—5 to 40 inches; red (2.5YR 4/6) fine sandy loam, reddish brown (2.5YR 4/4) moist; weak coarse prismatic structure parting to moderate fine subangular blocky; slightly hard, very friable; common very fine roots; many very fine tubular pores; slightly effervescent, (5 percent calcium carbonate equivalent); moderately alkaline; abrupt smooth boundary.

2Ck—40 to 46 inches; red (2.5YR 4/6) silty clay loam, reddish brown (2.5YR 4/4) moist; strong fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; strongly effervescent, (7 percent calcium carbonate equivalent); lime accumulations as few fine filaments and threads; moderately alkaline; abrupt smooth boundary.

2C—46 to 56 inches; red (2.5YR 4/6) loam, reddish brown (2.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; strongly effervescent, (7 percent calcium carbonate equivalent); moderately alkaline; abrupt smooth boundary.

3C—56 to 60 inches; red (2.5YR 4/6) fine sandy loam, reddish brown (2.5YR 4/4) moist; massive; slightly hard, very friable; few very fine roots; many very fine tubular pores; strongly effervescent, (7 percent calcium carbonate equivalent); moderately alkaline.

Range in Characteristics

Hue: 5YR or 7.5YR
Value: 4 through 6 dry
Chroma: 4 or 6

A horizon:
Reaction—slightly or moderately alkaline

B and C horizons:
Reaction—moderately or strongly alkaline

C horizon:
Calcium carbonate equivalent—3 to 10 percent

Some pedons contain discontinuous thin strata of finer and coarser soil material.

Padilla Series

Depth class: very deep
Drainage class: well drained
Permeability: slow
Landform: fan terraces
Parent material: alluvium from shale
Slope range: 1 to 3 percent
Elevation: 4,800 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: fine, mixed, mesic Ustollic Haplargids

Typical Pedon

Padilla clay in an area of Padilla-Penistaja-Campanile complex, 1 to 6 percent slopes, about 4 miles northeast of Moccasin; 2,700 feet east and 600 feet south of the northwest corner of section 23, T. 41 N., R. 4 W.

A—0 to 2 inches; dark reddish brown (5YR 3/4) clay,

dark reddish brown (5YR 3/3) moist; strong very fine granular structure; slightly hard, firm, very sticky and very plastic; common very fine roots; many very fine tubular pores; slightly alkaline; abrupt smooth boundary.

Bt1—2 to 5 inches; reddish brown (5YR 4/4) clay, reddish brown (5YR 4/3) moist; moderate medium prismatic structure parting to strong very fine subangular blocky; hard, very firm, very sticky and very plastic; common very fine roots; many very fine tubular pores; common distinct clay films on ped faces and lining pores; slightly alkaline; clear wavy boundary.

Bt2—5 to 34 inches; reddish brown (5YR 4/4) clay, reddish brown (5YR 4/4) moist; strong medium prismatic structure parting to strong medium subangular blocky; extremely hard, extremely firm, very sticky and very plastic; few very fine roots that follow prism faces; many very fine tubular pores; many distinct clay films on ped faces and lining pores; slightly effervescent; lime is disseminated; few cracks less than 0.25 inches wide; slightly alkaline; gradual wavy boundary.

Bt3—34 to 60 inches; reddish brown (5YR 4/4) clay, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to strong medium subangular blocky; extremely hard, extremely hard, extremely firm, very sticky and very plastic; few very fine roots that follow prism faces; many very fine tubular pores; few faint clay films on ped faces and lining pores; slightly effervescent; common pressure faces; slightly alkaline.

Range in Characteristics

Clay content: 40 to 50 percent

A horizon:
Value—4 or 5 dry and moist
Chroma—3 or 4

Bt horizon:
Value—4 or 5 dry; 3 or 4 moist
Chroma—4 or 6

Some pedons have Bk horizons.

Palma Series

Depth class: very deep
Drainage class: somewhat excessively drained
Permeability: moderately rapid
Landform: fan terraces
Parent material: alluvium from sandstone
Slope range: 1 to 5 percent
Elevation: 4,800 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: coarse-loamy, mixed, mesic Ustollic Haplargids

Typical Pedon

Palma loamy fine sand, 1 to 5 percent slopes, about 4 miles west of Colorado City; 2,000 feet west and 2,100 feet north of the southeast corner section 35, T. 42 N., R. 7 W.

A—0 to 4 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; single grain; loose; common very fine roots; many very fine interstitial pores; slightly alkaline; abrupt smooth boundary.

BA—4 to 8 inches; brown (7.5YR 5/4) loamy fine sand, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable; common very fine roots; many very fine tubular pores; moderately alkaline; clear wavy boundary.

Bt—8 to 33 inches; yellowish red (5YR 4/6) fine sandy loam, reddish brown (2.5YR 4/4) moist; weak medium prismatic structure parting to medium fine subangular blocky; slightly hard, friable; few fine roots; many medium pores; few faint clay films on ped faces and lining pores; few discontinuous 0.25 to 0.50 inch horizontal bands of sandy clay loam; moderately alkaline; gradual wavy boundary.

B1—33 to 48 inches; yellowish red (5YR 5/6) fine sandy loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, very friable; few fine roots; many fine tubular pores; slightly effervescent, (6 percent calcium carbonate equivalent); moderately alkaline; clear wavy boundary.

B2—48 to 60 inches; yellowish red (5YR 5/6) fine sandy loam, red (2.5YR 4/6) moist; massive; slightly hard, very friable; few fine roots; many fine tubular pores; slightly effervescent, (6 percent calcium carbonate equivalent); occasional decomposing sandstone gravel; moderately alkaline.

Range in Characteristics

Clay content: 10 to 15 percent

A horizon:
Hue—5YR or 7.5YR
Value—4 or 5 dry; 3 or 4 moist
Chroma—3 or 4

Bt horizon:
Hue—2.5YR, 5YR or 7.5YR
Value—4 or 5 dry and moist

Chroma—4 through 6

The BA horizon is absent in some pedons.

Penistaja Series

Depth class: very deep
Drainage class: well drained
Permeability: moderately slow
Landform: fan terraces
Parent material: alluvium from shale and sandstone
Slope range: 1 to 5 percent
Elevation: 4,800 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: fine-loamy, mixed, mesic Ustollic Haplargids

Typical Pedon

Penistaja fine sandy loam, 1 to 5 percent slopes, about 5 miles northeast of Moccasin; 900 feet east and 400 feet south of the northwest corner of section 18, T. 41 N., R. 3 W.

A—0 to 5 inches; brown (7.5YR 5/4) fine sandy loam, reddish brown (5YR 4/3) moist; weak fine granular structure; slightly hard, very friable; common very fine roots; common very fine tubular pores; slightly alkaline; abrupt smooth boundary.

Bt1—5 to 14 inches; red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; strong medium prismatic structure parting to strong subangular blocky; very hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine tubular pores; common distinct clay films on ped faces and lining pores; slightly alkaline; clear wavy boundary.

Bt2—14 to 19 inches; red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky; few very fine and fine roots; many very fine and fine tubular pores; few faint clay films on ped faces and lining pores; slightly alkaline; clear wavy boundary.

Bk—19 to 42 inches; yellowish red (5YR 5/6) fine sandy loam, red (2.5YR 4/6) moist; massive; slightly hard, very friable; few fine roots; common very fine tubular pores; strongly effervescent, (6 percent calcium carbonate equivalent); lime accumulations as few fine filaments and soft masses; slightly alkaline; abrupt smooth boundary.

2Bk—42 to 60 inches; red (2.5YR 4/6) silty clay loam, dark reddish brown (2.5YR 3/4) moist; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine and fine roots; common very fine tubular pores; strongly effervescent, (7 percent calcium carbonate equivalent); lime accumulations as common medium irregular soft masses; slightly alkaline.

Range in Characteristics

Average content of rock fragments in the control section: 0 to 5 percent gravel

A horizon:
Hue—7.5YR or 5YR
Value—3 or 4 moist
Chroma—3 or 4

Bt horizon:
Hue—2.5YR or 5YR
Value—3 or 4 moist; 4 or 5 dry
Chroma—4 or 6

Bk horizon:
Hue—2.5YR through 7.5YR
Value—4 or 5 dry; 3 or 4 moist
Chroma—4 or 6
Calcium carbonate equivalent—5 to 14 percent

Some pedons do not have discontinuities.

Pennell Series

Depth class: shallow
Drainage class: well drained
Permeability: moderately rapid
Landform: hills and mesas
Parent material: alluvium from limestone and sandstone
Slope range: 1 to 20 percent
Elevation: 4,700 to 5,100 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: loamy, mixed, mesic Lithic Calciorthids

Typical Pedon

Pennell gravelly sandy loam in an area of Pennell-Bacobi complex, 1 to 7 percent slopes, about 12 miles south of Pipe Spring National Monument; 2,600 feet west and 2,000 feet south of the northeast corner of section 14, T. 38 N., R. 4 W.

A—0 to 2 inches; brown (7.5YR 5/4) gravelly sandy loam, reddish brown (5YR 4/3) moist; weak fine

granular structure; soft, very friable; many very fine roots; many very fine tubular pores; slightly effervescent, (8 percent calcium carbonate equivalent); 15 percent gravel; slightly alkaline; abrupt smooth boundary.

Bw—2 to 6 inches; brown (7.5YR 5/4) sandy loam, reddish brown (5YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, very friable; common very fine roots; common very fine tubular pores; strongly effervescent, (11 percent calcium carbonate equivalent); 5 percent gravel; moderately alkaline; clear smooth boundary.

Bk1—6 to 9 inches; brown (7.5YR 5/4) sandy loam, reddish brown (5YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, very friable; common very fine roots; common very fine tubular pores; strongly effervescent, (12 percent calcium carbonate equivalent); 5 percent lime-coated gravel; moderately alkaline; clear wavy boundary.

Bk2—9 to 12 inches; brown (7.5YR 5/4) gravelly sandy loam, reddish brown (5YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable; common very fine roots; common very fine tubular pores; violently effervescent, (17 percent calcium carbonate equivalent); lime accumulations as few fine soft masses; 5 percent cobble, 15 percent gravel; moderately alkaline; abrupt smooth boundary.

2R—12 inches; limestone.

Range in Characteristics

Depth to bedrock: 10 to 20 inches
Average content of rock fragments in the control section: 0 to 25 percent
Hue: 5YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 4 or 6

Bk horizon:
Calcium carbonate equivalent—12 to 25 percent

Poley Series

Depth class: very deep
Drainage class: well drained
Permeability: slow
Landform: fan terraces
Parent material: alluvium from basalt and pyroclastics
Slope range: 1 to 5 percent
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: fine, mixed, mesic Ustollic Haplargids

Typical Pedon

Poley very cobbly silt loam, in an area of Poley-Moab complex, 1 to 10 percent slopes, about 9 miles north of Mount Trumbull; 2,700 feet south and 1,650 feet east of the northwest corner of section 10, T. 36 N., R. 8 W.

A—0 to 2 inches; dark brown (7.5YR 4/4) very cobbly silt loam, dark brown (7.5YR 3/3) moist; weak thin platy structure parting to weak granular; slightly hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; 30 percent cobble, 20 percent gravel; neutral; abrupt smooth boundary.

AB—2 to 4 inches; dark brown (7.5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak thin platy structure parting to fine granular; slightly hard, friable, very sticky and plastic; few very fine roots; common very fine tubular pores; 5 percent gravel; slightly alkaline; abrupt smooth boundary.

Bt—4 to 11 inches; dark brown (7.5YR 4/4) silty clay, dark reddish brown (5YR 3/4) moist; moderate medium prismatic structure parting to strong fine and medium subangular blocky; hard, firm, very sticky and very plastic; common very fine roots; common very fine tubular pores; many prominent clay films on ped faces and lining pores; slightly alkaline; clear smooth boundary.

Btk1—11 to 15 inches; mixed light brown (7.5YR 6/4) and pink (7.5YR 7/4) silty clay, reddish brown (5YR 4/4) and pink (5YR 7/4) moist; moderate medium subangular blocky structure; hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; strongly effervescent; common fine nodules; few faint clay films on ped faces and lining pores; slightly alkaline; clear smooth boundary.

Btk2—15 to 18 inches; mixed light brown (7.5YR 6/4) and pink (7.5YR 8/4) silty clay loam, brown (7.5YR 5/4) and pink (7.5YR 7/4) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; strongly effervescent; many fine nodules; moderately alkaline; clear smooth boundary.

Bk1—18 to 27 inches; pink (7.5YR 8/4) silt loam, light brown (7.5YR 6/4) and brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; violently effervescent; lime accumulations

as few fine soft masses; weakly cemented; 5 percent gravel; moderately alkaline; clear smooth boundary.

Bk2—27 to 36 inches; mixed pink (5YR 8/3) and reddish brown (5YR 5/4) silty clay loam, pink (5YR 7/4) and light reddish brown (5YR 6/4) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; few faint clay films; violently effervescent; many fine nodules; 5 percent gravel; moderately alkaline; clear wavy boundary.

2Bk1—36 to 49 inches; mixed reddish brown (5YR 5/4) and pink (5YR 8/3) clay loam, reddish brown (5YR 5/4) and pink (5YR 7/4) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; common faint clay films; violently effervescent; common fine nodules; moderately alkaline; clear wavy boundary.

2Bk2—49 to 60 inches; reddish brown (5YR 5/4) extremely cobbly loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; few faint clay films; violently effervescent; few small nodules; 50 percent lime-coated cobble and 20 percent lime-coated gravel; moderately alkaline.

Range in Characteristics

Depth to a calcic horizon: 16 to 25 inches
Average content of rock fragments in the control section: less than 15 percent (ranges to 35 percent in some horizons)
Hue: 5YR or 7.5YR

A horizon:
Value—4 or 5 dry; 3 or 4 moist
Chroma—3 or 4

Bt horizon:
Value—4 through 8 dry; 3 through 7 moist
Chroma—4 or 6

Bk horizon:
Value—5 through 8 dry; 4 through 6 moist
Chroma—3 through 6

Poley soils have montmorillonitic mineralogy and dominant textures of silty clay and silty clay loam. These characteristics are outside the range defined for the series, but they do not significantly affect the use or behavior of the soils.

Prieta Series

Depth class: shallow
Drainage class: well drained
Permeability: slow
Landform: hills
Parent material: alluvium from basalt and pyroclastics
Slope range: 4 to 20 percent
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: clayey-skeletal, mixed, mesic Lithic Ustollic Haplargids

Typical Pedon

Prieta very gravelly loam, in an area of Curhollow-Prieta complex, 4 to 20 percent slopes, about 6 miles northeast of Mount Trumbull; 400 feet west and 1,000 feet south of the northeast corner of section 17, T. 36 N., R. 7 W.

A—0 to 2 inches; brown (7.5YR 5/3) very gravelly loam, dark brown (7.5YR 3/2) moist; moderate thin platy structure; slightly hard, very friable; many very fine roots; many very fine tubular pores; 40 percent gravel, 10 percent cobble; slightly alkaline; abrupt smooth boundary.

Bt1—2 to 6 inches; brown (7.5YR 5/4) very gravelly silty clay loam, dark brown (7.5YR 4/2) moist; strong very fine subangular blocky structure; slightly hard, friable, sticky and plastic; many fine roots; common very fine tubular pores; few faint clay films on ped faces and lining pores; 40 percent gravel, 10 percent cobble; slightly alkaline; clear wavy boundary.

Btk1—6 to 10 inches; dark brown (7.5YR 4/3) very gravelly silty clay, dark brown (7.5YR 4/2) moist; strong fine subangular blocky structure; hard, firm, very sticky and very plastic; many medium roots; common very fine tubular pores; common distinct clay films on ped faces and lining pores; lime accumulations as coating on undersides of gravel; 40 percent gravel, 10 percent cobble; moderately alkaline; clear wavy boundary.

Btk2—10 to 16 inches; dark brown (7.5YR 4/3) very gravelly silty clay, dark brown (7.5YR 4/2) moist; strong fine subangular blocky structure; hard, firm, very sticky and plastic; common medium roots; common very fine tubular pores; common faint clay films on ped faces and lining pores; slightly effervescent; lime accumulations as coatings on undersides of gravel; 40 percent gravel, 10 percent

cobble; moderately alkaline; abrupt smooth boundary.
2R—16 inches; basalt with a discontinuous lime coat.

Range in Characteristics

Depth to bedrock: 10 to 20 inches
Average content of rock fragments in the control section: 35 to 60 percent gravel and cobble
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 2 or 4

Progresso Series

Depth class: moderately deep
Drainage class: well drained
Permeability: moderate
Landform: fan terraces
Parent material: alluvium from limestone
Slope range: 1 to 7 percent
Elevation: 5,000 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: fine-loamy, mixed, mesic Ustollic Haplargids.

Typical Pedon

Progresso sandy loam in an area of Mellenthin-Progresso complex, 1 to 7 percent slopes, about 16 miles south-southwest of Pipe Spring National Monument; 800 feet north and 2,500 feet west of the southeast corner of section 11, T. 37 N., R. 5 W.

A—0 to 1 inch; yellowish red (5YR 4/6) sandy loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; slightly hard, very friable; many very fine roots; many very fine interstitial pores; slightly effervescent; 10 percent gravel; slightly alkaline; abrupt smooth boundary.
Bt1—1 to 4 inches; yellowish red (5YR 4/6) sandy loam, reddish brown 5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly plastic; many very fine roots; common very fine tubular pores; few faint clay films on ped faces and lining pores; slightly effervescent; 5 percent gravel; slightly alkaline; clear smooth boundary.
Bt2—4 to 12 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate coarse prismatic structure parting to moderate fine subangular blocky; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; common faint clay films on ped faces and lining pores; strongly effervescent; slightly alkaline; clear smooth boundary.
Bk—12 to 27 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate coarse prismatic structure parting to weak fine subangular blocky; slightly hard, very friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; violently effervescent; lime accumulations as common fine soft masses; slightly alkaline; abrupt smooth boundary.
2R—27 inches; limestone.

Range in Characteristics

Depth to a calcic horizon: 10 to 24 inches
Depth to bedrock: 20 to 40 inches
Average content of rock fragments in the control section: 0 to 15 percent gravel
Hue: 5YR or 7.5YR
Clay content: 18 to 35 percent

A horizon:
Value—4 or 5 dry; 3 or 4 moist
Chroma—3 through 6

Bt horizon:
Value—4 or 5 dry and moist
Chroma—4 or 6

Bk horizon:
Value—5 or 6 dry; 4 or 5 moist
Chroma—4 or 6

Radnik Series

Depth class: very deep
Drainage class: well drained
Permeability: moderately rapid
Landform: alluvial fans
Parent material: alluvium from sandstone
Slope range: 1 to 5 percent
Elevation: 4,900 to 5,100 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents

Typical Pedon

Radnik fine sandy loam, 1 to 5 percent slopes, about 3

miles northeast of Moccasin; 700 feet west and 200 feet north of the southeast corner of section 28, T. 41 N, R. 4 W.

C1—0 to 4 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; loose, very friable; common very fine roots; many very fine interstitial pores; slightly alkaline; clear wavy boundary.

C2—4 to 60 inches; reddish brown (2.5YR 5/4) stratified fine sandy loam, reddish brown (2.5YR 4/4) moist; massive; slightly hard, very friable; few very fine roots; common very fine tubular pores; slightly effervescent; lime disseminated; few pockets and discontinuous thin strata of coarse sand; few krotovina; slightly alkaline.

Range in Characteristics

Hue: 2.5YR or 5YR
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 3 through 6

Stratifications of finer and coarser material is common.

Royosa Series

Depth class: very deep
Drainage class: excessively drained
Permeability: rapid
Landform: plateaus
Parent material: eolian sands from sandstone
Slope range: 1 to 10 percent
Elevation: 5,600 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days
Classification: mixed, mesic Typic Ustipsamments

Typical Pedon

Royosa fine sand in an area of Royosa-Tonalea complex, 1 to 15 percent slopes, about 3 miles northwest of Moccasin; 1,900 feet north and 600 feet east of the southwest corner of section 23, T. 41 N., R. 5 W.

A—0 to 2 inches; reddish yellow (7.5YR 6/6) fine sand, strong brown (7.5YR 4/6) moist; single grain; loose; many very fine roots; slightly alkaline; abrupt smooth boundary.

C1—2 to 19 inches; brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) moist; massive; slightly hard, very friable; many fine roots; few very fine tubular pores; slightly alkaline; gradual wavy boundary.

C2—19 to 37 inches; strong brown (7.5YR 5/6) fine sand, strong brown (7.5YR 4/6) moist; massive; slightly hard, very friable; few medium roots; few very fine tubular pores; few thin stratifications of darker soil material; slightly alkaline; gradual wavy smooth boundary.

C3—37 to 60 inches; reddish yellow (7.5YR 6/6) loamy fine sand, strong brown (7.5YR 4/6) moist; massive slightly hard, very friable; few very fine roots; few very fine tubular pores; slightly alkaline.

Range in Characteristics

Hue: 5YR or 7.5YR
Value: 5 or 6 dry
Chroma: 4 or 6

Saido Series

Depth class: very deep
Drainage class: well drained
Permeability: moderate
Landform: fan terraces
Parent material: alluvium from gypsiferous shales and mudstone
Slope range: 1 to 5 percent
Elevation: 4,600 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: coarse-silty, gypsic, mesic Typic Gypsiorthids

Typical Pedon

Saido silt loam in an area of Saido-Brinkerhoff complex, 1 to 5 percent slopes; about 9 miles west-southwest of Colorado City; 400 feet east of the southwest corner of section 10, T. 40 N., R. 7 W.

A—0 to 1 inches; light brown (7.5YR 6/4) silt loam, dark brown (7.5YR 4/4) moist; weak fine and very fine granular structure; soft, very friable; few very fine roots; common very fine tubular pores; slightly effervescent; 3 percent gypsum; slightly alkaline; abrupt smooth boundary.

BA—1 to 3 inches; pink (7.5YR 7/4) silt loam, light brown (7.5YR 6/4) moist; weak thin platy structure parting to weak fine granular; slightly hard, very friable; few very fine roots; common very fine tubular pores; slightly effervescent; 42 percent gypsum; slightly alkaline; abrupt smooth boundary.

Bw—3 to 9 inches; pink (7.5YR 7/4) silt loam, reddish yellow (7.5YR 7/6) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; hard, friable; few very fine and fine roots;

many very fine tubular pores; violently effervescent; 42 percent gypsum; moderately alkaline; clear smooth boundary.

By1—9 to 17 inches; pinkish white (7.5YR 8/2) silt loam, pink (7.5YR 8/4) moist; weak thick platy structure; hard, friable; few fine roots; many very fine tubular pores; violently effervescent; 41 percent gypsum; moderately alkaline; abrupt smooth boundary.

By2—17 to 25 inches; pinkish white (7.5YR 8/2) silt loam, pink (7.5YR 8/4) moist; weak thick platy structure; hard, friable; few very fine roots; many very fine tubular pores; violently effervescent; 41 percent gypsum; moderately alkaline; gradual wavy boundary.

By3—25 to 35 inches; pinkish white (7.5YR 8/2) silt loam, pink (7.5YR 8/4) moist; weak thick platy structure; hard, friable; few very fine roots; common very fine tubular pores; violently effervescent; moderately alkaline; 43 percent gypsum; gradual wavy boundary.

By4—35 to 45 inches; pinkish white (7.5YR 8/2) silt loam, reddish yellow (7.5YR 8/6) moist; weak thick platy structure; hard, friable, few very fine roots; common very fine tubular pores; violently effervescent; 42 percent gypsum; moderately alkaline; gradual wavy boundary.

By5—45 to 60 inches; pinkish white (7.5YR 8/2) and reddish yellow (7.5YR 8/6) silt loam, reddish yellow (7.5YR 7/6 and 8/6) moist; weak thick platy structure; hard, friable; few very fine roots; few very fine tubular pores; violently effervescent; 40 percent gypsum; moderately alkaline; gradual wavy boundary.

Range in Characteristics

Depth to a gypsic horizon: 2 to 9 inches
Thickness of gypsic horizon: 10 to 35 inches

A horizon:
Hue—5YR, 7.5YR or 10YR
Value—5 or 6 dry; 4 or 5 moist
Chroma—3 or 4

B horizon:
Hue—7.5YR or 10YR
Value—6 through 8
Chroma—2, 3 or 4

Section Series

Depth class: very deep
Drainage class: well drained
Permeability: moderate
Landform: hills and fan terraces
Parent material: alluvium and colluvium from limestone and volcanic rocks
Slope range: 1 to 15 percent
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days
Classification: fine-loamy, mixed, mesic Aridic Calciustolls

Typical Pedon

Section gravelly loam in an area of Showlow-Section complex, 1 to 15 percent slopes; about 6 miles west of Nixon Springs; 1,700 feet east and 300 feet north of the southwest corner of section 22, T. 35 N., R. 9 W.

A—0 to 2 inches; dark brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky; few very fine roots; many fine tubular pores; strongly effervescent; 20 percent gravel; slightly alkaline; abrupt smooth boundary.

Bw—2 to 6 inches; dark brown (7.5YR 4/4) loam, dark brown (7.5YR 3/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky; many fine roots; common very fine tubular pores; violently effervescent; 1 percent gravel; slightly alkaline; clear wavy boundary.

Bk1—6 to 22 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; common fine subangular blocky structure; hard, firm, sticky and slightly plastic; few fine roots; common fine tubular pores; violently effervescent; lime accumulations as few fine soft masses; 1 percent gravel with lime coatings on undersides; moderately alkaline; clear wavy boundary.

Bk2—22 to 34 inches; light brown (7.5YR 6/4) loam, strong brown (7.5YR 5/6) moist; common fine subangular blocky structure; hard, firm, sticky and slightly plastic; few fine roots; common fine tubular pores; violently effervescent; lime accumulations as common fine soft masses; 1 percent gravel; few cicada nodules; moderately alkaline; clear wavy boundary.

Bk3—34 to 60 inches; reddish brown (5YR 5/4) loam, yellowish red (5YR 4/6) moist; common fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; common fine tubular pores; violently effervescent; lime accumulations as common fine lime filaments and threads; 1 percent gravel; moderately alkaline.

Range in Characteristics

Depth to a calcic horizon: 5 to 20 inches
Average content of rock fragments in the control section: less than 15 percent
Clay content: 18 to 35 percent

A and Bw horizon:
Value—4 or 5 dry; 3 or 4 moist
Chroma—3 or 4

Bk horizon:
Hue—5YR or 7.5YR
Value—5 or 6 dry; 4 or 5 moist
Chroma—4 or 6

The Bw horizon is absent in some pedons.

Sheppard Series

Depth class: very deep
Drainage class: somewhat excessively drained
Permeability: rapid
Landform: fan terraces and stream terraces
Parent material: alluvium and eolian sands from sandstone
Slope range: 1 to 7 percent
Elevation: 4,600 to 5,000 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 55 to 57 degrees F
Frost-free period: 165 to 180 days
Classification: mixed, mesic Typic Torripsamments

Typical Pedon

Sheppard fine sand, 1 to 7 percent slopes; about 12 miles east-southeast of Moccasin; 400 feet west and 1,200 feet north of the southeast corner of section 11, T. 40 N., R. 3 W.

C1—0 to 2 inches; reddish brown (5YR 5/4) fine sand, reddish brown (5YR 4/4) moist; single grain; loose; few very fine roots; many very fine interstitial pores; slightly alkaline; abrupt smooth boundary.
C2—2 to 26 inches; yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; few very fine roots; common very fine tubular pores; moderately alkaline; clear wavy boundary.
C3—26 to 60 inches; yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; few very fine roots; few very fine tubular pores; slightly effervescent; moderately alkaline.

Range in Characteristics

Hue: 5YR or 7.5YR
Value: 5 or 6
Chroma: 4 or 6
Texture of the A horizon: loamy fine sand or fine sand

Showlow Series

Depth class: very deep
Drainage class: well drained
Permeability: slow
Landform: hills and fan terraces
Parent material: alluvium and colluvium from basalt and pyroclastics
Slope range: 1 to 35 percent
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days
Classification: fine, montmorillonitic, mesic Aridic Argiustolls.

Typical Pedon

Showlow very cobbly clay loam, 1 to 15 percent slopes, about 5 miles west of Mount Trumbull; 100 feet south and 200 feet east of the northwest corner of section 26, T. 35N., R. 9 W.

A—0 to 3 inches; brown (7.5YR 5/4) very cobbly clay loam, dark brown (7.5YR 3/3) moist; weak thin platy and moderate fine granular structure; slightly hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; slightly effervescent; 20 percent cobbles, 20 percent gravel; slightly alkaline; abrupt smooth boundary.
AB—3 to 7 inches; brown (7.5YR 5/3) clay loam, dark brown (7.5YR 3/3) moist; strong fine and medium subangular blocky structure; hard, firm, sticky and very plastic; common fine roots; common very fine tubular pores; slightly effervescent; moderately alkaline; clear smooth boundary.
Bt1—7 to 16 inches; brown (7.5YR 5/3) silty clay, dark brown (7.5YR 3/3) moist; moderate medium prismatic structure parting to strong fine subangular blocky; very hard, very firm, very sticky and very plastic; few fine coarse roots; common very fine tubular pores; few pressure faces; slightly effervescent; moderately alkaline; clear smooth boundary.
Bt2—16 to 25 inches; brown (7.5YR 5/3) silty clay, dark brown (7.5YR 3/3) moist; moderate medium prismatic structure parting to strong fine and medium subangular blocky; very hard, very firm, very sticky and very plastic; few fine roots; common very fine tubular pores; common pressure

faces; slightly effervescent; moderately alkaline; clear smooth boundary.

Bt3—25 to 35 inches; brown (7.5YR 5/3) silty clay, dark brown (7.5YR 3/3) moist; moderate medium prismatic structure parting to strong medium and fine subangular blocky; very hard, very firm, very sticky, very plastic; few fine roots; common very fine tubular pores; slightly effervescent; moderately alkaline; clear smooth boundary.

Btk—35 to 42 inches; brown (7.5YR 5/4) silty clay, yellowish red (5YR 4/6) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; common pressure faces; violently effervescent; lime accumulations as few soft masses; moderately alkaline; clear wavy boundary.

2Btkb1—42 to 52 inches; mixed reddish brown (5YR 5/4) and pink (7.5YR 7/4) very gravelly clay loam, dark reddish brown (5YR 3/4) and pink (7.5YR 7/4) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; common distinct clay films; violently effervescent; lime accumulations as many large soft masses; 30 percent gravel, 5 percent cobble; moderately alkaline; clear wavy boundary.

2Btkb2—52 to 60 inches; mixed light reddish brown (5YR 6/4) and pink (7.5YR 7/4) very gravelly loam, dark reddish brown (5YR 3/4) and pink (7.5YR 7/4) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; common distinct clay films; violently effervescent; lime accumulations as many large soft nodules; 30 percent gravel; 5 percent cobble; strongly alkaline.

Range in Characteristics

Depth to a calcic horizon: 20 to 40 inches
Average content of rock fragments in the control section: 0 to 35 percent gravel and cobble
Hue: 5YR or 7.5YR
Value: 5 or 6
Chroma: 3, 4, or 6

The AB and buried horizons are absent in some pedons.

Sponiker Series

Depth class: very deep
Drainage class: well drained
Permeability: slow
Landform: hills and fan terraces
Parent material: alluvium from basalt and pyroclastics
Slope range: 1 to 40 percent
Elevation: 6,400 to 7,200 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 120 to 135 days
Classification: fine, montmorillonitic, mesic Pachic Argiustolls

Typical Pedon

Sponiker gravelly loam, 1 to 15 percent slopes, about 2 miles south of Mount Trumbull; 2,100 feet east and 200 feet south of the northwest corner of section 4, T. 34 N., R. 8 W.

Oi—1 to 0 inches; pine needles.

A—0 to 4 inches; dark brown (7.5YR 4/2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; many very fine tubular pores; 25 percent gravel; slightly alkaline; clear wavy boundary.

Bt1—4 to 12 inches; dark brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate very fine subangular blocky structure; hard, firm, sticky and plastic; many medium roots; common very fine tubular pores; few faint clay films on ped faces and lining pores; 5 percent gravel, 5 percent cobble; slightly alkaline; clear wavy boundary.

Bt2—12 to 22 inches; dark brown (7.5YR 4/3) cobbly clay loam, dark brown (7.5YR 3/2) moist; strong fine angular blocky structure; hard, firm, sticky and plastic; many medium roots; common very fine tubular pores; few faint clay films on ped faces and lining pores; 20 percent cobble, 10 percent gravel; slightly alkaline; clear wavy boundary.

Bt3—22 to 30 inches; brown (7.5YR 5/3) clay, dark brown (7.5YR 3/3) moist; strong medium angular blocky structure; hard, firm, very sticky and very plastic; common medium roots; common very fine tubular pores; many distinct clay films on ped faces and lining pores; 1 percent gravel; slightly alkaline; clear wavy boundary.

Bt4—30 to 60 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; strong medium angular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; common very fine tubular pores; many distinct clay films on ped faces and lining pores; 1 percent gravel; slightly alkaline.

Range in Characteristics

Average content of rock fragments in the control section: less than 15 percent

A horizon:

Hue—5YR or 7.5YR
Value—3 or 4 dry; 2 or 3 moist
Chroma—2 or 3

Bt horizon:
Hue—5YR or 7.5YR
Value—4 or 5 dry; 3 or 4 moist
Chroma—3 or 4 dry; 2 to 4 moist

A Bk horizon is present in some pedons.

Thimble Series

Depth class: shallow
Drainage class: well drained
Permeability: slow
Landform: hills
Parent material: alluvium from basalt and pyroclastics
Slope range: 1 to 15 percent
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days
Classification: clayey-skeletal, montmorillonitic, mesic Lithic Argiustolls

Typical Pedon

Thimble cobbly clay loam in an area of Showlow-Thimble complex, 1 to 15 percent slopes, about 6 miles northeast of Mount Trumbull; 800 feet south and 800 feet west of the northeast corner of section 14, T. 35 N., R. 7 W.

A—0 to 1 inch; brown (7.5YR 5/4) cobbly clay loam, dark brown, (7.5YR 4/2) moist; strong fine granular structure; slightly hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; 20 percent cobble, 10 percent gravel; slightly alkaline; clear wavy boundary.

Btk1—1 to 7 inches; dark brown (7.5YR 4/2) very cobbly clay, dark brown (7.5YR 3/2) moist; strong fine subangular blocky structure; very hard, very firm, very sticky and very plastic; common medium roots; many very fine tubular pores; many prominent clay films on ped faces and lining pores; lime accumulations as coatings on undersides of rock fragments; 20 percent cobble, 10 percent stones, 10 percent gravel; slightly alkaline; clear wavy boundary.

Btk2—7 to 13 inches; dark brown (7.5YR 4/2) very cobbly clay, dark brown (7.5YR 4/2) moist; strong fine subangular structure; very hard, very firm, very sticky and very plastic; common medium roots; many very fine tubular pores; many prominent clay films on ped faces and lining pores; lime accumulations as coatings on undersides of rock fragments; 20 percent cobble, 10 percent stones, 10 percent gravel; slightly alkaline; clear wavy boundary.

Btk3—13 to 19 inches; dark brown (7.5YR 4/4) very cobbly clay loam, reddish brown (5YR 4/3) moist; moderate fine subangular structure; hard, firm, sticky and plastic; common medium roots; many very fine tubular pores; few faint clay films on ped faces and lining pores; strongly effervescent, (6 percent calcium carbonate equivalent); lime accumulations as coatings on undersides of rock fragments; 20 percent cobble, 10 percent stones, 10 percent gravel; slightly alkaline; abrupt smooth boundary.

2R—19 inches; basalt; discontinuous 0.25 to 0.75 inch hardpan; lime filling fractures.

Range in Characteristics

Depth to bedrock: 10 to 20 inches
Average content of rock fragments in the control section: 35 to 60 percent

A horizon:
Value—4 or 5 dry; 3 or 4 moist
Chroma—2 through 4 dry or moist

Bt horizon:
Value—4 through 6 dry; 3 through 5 moist
Chroma—2, 3, or 4 dry or moist

Some pedons are noneffervescent.

Tonalea Series

Depth class: moderately deep
Drainage class: excessively drained
Permeability: rapid
Landform: plateaus
Parent material: eolian sand from sandstone
Slope range: 3 to 15 percent
Elevation: 5,600 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days
Classification: mixed, mesic Typic Ustipsamments

Typical Pedon

Tonalea fine sand in an area of Royosa-Tonalea complex, 1 to 15 percent slopes, about 3 miles northwest of Moccasin; 1,800 feet north and 300 feet east of the southwest corner of section 23, T. 41 N., R. 5 W.

A—0 to 2 inches; strong brown (7.5YR 5/6) fine sand, dark brown (7.5YR 4/4) moist; single grain; loose;

many very fine roots; slightly alkaline; abrupt smooth boundary.

C—2 to 30 inches; brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) moist; massive; soft, very friable; few medium roots; few very fine tubular pores; slightly alkaline; abrupt smooth boundary.

2R—30 inches; sandstone.

Range in Characteristics

Depth to bedrock: 20 to 40 inches
Value: 5 or 6
Chroma: 4 or 6

Some pedons have a thin layer of weathered sandstone above the bedrock.

Torriorthents

Depth class: very shallow to very deep
Drainage class: well to somewhat excessive
Permeability: very slow to very rapid
Landform: hills and escarpments
Parent material: colluvium and alluvium from sandstone, limestone and shale
Slope range: 30 to 70 percent
Elevation: 3,500 to 7,200 feet
Mean annual precipitation: 6 to 14 inches
Mean annual air temperature: 52 to 72 degrees F
Frost-free period: 150 to 240 days
Classification: Torriorthents

Reference Pedon

Reference pedon of Torriorthents, in an area of Torriorthents-Rock outcrop complex, dry, 30 to 70 percent slopes; about 7 miles east of Colorado City; 200 feet south and 400 feet west of the northeast corner of section 5, T. 41 N., R. 5 W.

A—0 to 2 inches; reddish brown (2.5YR 5/4) very bouldery sandy loam, reddish brown (2.5YR 4/4) moist; moderate fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; few fine tubular pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C—2 to 11 inches; reddish brown (2.5YR 5/4) loam, reddish brown (2.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine tubular pores; slightly effervescent; moderately alkaline; clear smooth boundary.

2Cr—11 inches; shale.

Range in Characteristics

Texture in the control section: loamy sand through clay
Reaction: slightly to strongly alkaline

Whiskey Series

Depth class: very deep
Drainage class: well drained
Permeability: moderate
Landform: stream terraces
Parent material: mixed alluvium
Slope range: 1 to 4 percent
Elevation: 5,800 to 7,000 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days
Classification: fine-loamy, mixed, mesic Pachic Haplustolls

Typical Pedon

Whiskey silt loam, 1 to 4 percent slopes, about 4 miles northeast of Mount Trumbull; 1,600 feet south and 100 feet west of the northeast corner of section 6, T. 35 N., R. 7 W.

A—0 to 5 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, slightly plastic; many very fine roots; many very fine tubular pores; slightly effervescent; 2 percent gravel; moderately alkaline; abrupt wavy boundary.

Bw—5 to 13 inches; dark brown (7.5YR 4/4) loam, dark brown (7.5YR 3/3) moist; moderate very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; slightly effervescent; 2 percent gravel; moderately alkaline; clear wavy boundary.

Bk—13 to 32 inches; dark brown (7.5YR 4/4) loam, dark brown (7.5YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common medium roots; many fine tubular pores; strongly effervescent, (9 percent calcium carbonate equivalent); lime accumulations as few fine filaments and threads; 5 percent gravel; moderately alkaline; gradual wavy boundary.

C—32 to 60 inches; dark brown (7.5YR 4/4) loam, dark brown (7.5YR 3/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; strongly

effervescent; 10 percent gravel; moderately alkaline.

Range in Characteristics

Average content of rock fragments in the control section: 0 to 15 percent gravel
Hue: 7.5YR or 10YR
Value: 4 or 5 dry; 3 or 4 moist
Effervescence: noneffervescent to strongly effervescent
Reaction: neutral to moderately alkaline

The Bw and Bk horizons are absent in some pedons.

Wukoki Series

Depth class: very deep (shallow to cinders)
Drainage class: somewhat excessively
Permeability: moderate
Landform: cinder cones
Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics.
Slope range: 15 to 50 percent
Elevation: 5,500 to 5,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 165 days
Classification: loamy-skeletal over fragmental, mixed, mesic Vitrustandic Camborthids

Typical Pedon

Wukoki extremely gravelly loam in an area of Wukoki-Lomaki complex, 15 to 50 percent slopes; about 11 miles north of Mount Trumbull; 680 feet east and 2,050 feet south of the northwest corner of section 23, T. 37 N., R. 8 W.

A1—0 to 1 inch; yellowish brown (10YR 5/4) extremely gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, very friable; few very fine roots; many very fine medium pores; 80 percent cinders; slightly alkaline; abrupt smooth boundary.
A2—1 to 3 inches; yellowish brown (10YR 5/4) extremely gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, very friable; few fine roots; many medium tubular pores; 70 percent cinders; slightly alkaline; abrupt smooth boundary.
Bw—3 to 10 inches; light yellowish brown (10YR 6/4) extremely gravelly loam, dark brown (10YR 4/3) moist; weak very fine subangular blocky structure; slightly hard, very friable; few medium roots; common fine pores; 70 percent cinders; slightly alkaline; abrupt smooth boundary.
2C—10 to 60 inches; black cinders; common medium roots; few pockets with lime accumulations on sides and bottoms of cinders.

Range in Characteristics

Depth to cinders: 5 to 20 inches
Average content of rock fragments in the control section: 60 to 75 percent cinders
Hue: 7.5YR and 10YR
Value: 5 or 6
Chroma: 3 or 4

Some pedons have a cinder lag on the surface up to 2 inches thick.

Wutoma Series

Depth class: very deep (shallow to cinders)
Drainage class: somewhat excessively
Permeability: moderate
Landform: cinder cones and fan terraces
Parent material: alluvium and colluvium from scoriaceous basalt and pyroclastics
Slope range: 1 to 50 percent
Elevation: 6,500 to 7,200 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days
Classification: loamy-skeletal over fragmental, mixed, mesic Vitrandic Ustochrepts

Typical Pedon

Wutoma extremely gravelly loam in an area of Wutoma-Lozinta complex, 15 to 50 percent slopes, about 6 miles south of Mount Trumbull; 2,000 feet west and 1,600 feet south of the northeast corner of section 20, T. 34 N., R. 8 W.

A—0 to 2 inches; dark brown (10YR 4/3) extremely gravelly loam, very dark gray (10YR 3/1) moist; slightly hard, very friable; many very fine roots; many very fine tubular pores; 75 percent cinders; neutral; abrupt smooth boundary.
Bw—2 to 12 inches; dark brown (10YR 4/3) extremely gravelly loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; slightly hard, very friable; many fine roots; many fine tubular pores; 70 percent cinders; slightly alkaline; abrupt smooth boundary.

2C—12 to 60 inches; black cinders; few medium roots; few pockets and stratifications of extremely cindery loam.

Range in Characteristics

Depth to cinders: 11 to 20 inches
Average content of rock fragments in the control section: 60 to 75 percent cinders
Hue: 7.5YR or 10YR
Value: 3 or 4
Chroma: 1 through 4

Yumtheska Series

Depth class: very shallow and shallow
Drainage class: well drained
Permeability: moderate
Landform: hills
Parent material: alluvium and colluvium from limestone
Slope range: 1 to 50 percent
Elevation: 5,800 to 6,400 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 150 days
Classification: loamy-skeletal, mixed, mesic Lithic Calciustolls

Typical Pedon

Yumtheska very gravelly loam, 4 to 20 percent slopes, about 3 miles northeast of Mount Trumbull: 900 feet south and 800 feet west of the northeast corner of section 14, T. 35 N., R. 7 W.

A—0 to 2 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, very friable; many very fine roots; many very fine tubular pores; slightly effervescent; 50 percent gravel; slightly alkaline; abrupt smooth boundary.

Bk1—2 to 5 inches; brown (7.5YR 5/3) very gravelly loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable; many very fine roots; common very fine tubular pores; strongly effervescent, (13 percent calcium carbonate equivalent); lime accumulations as coatings on undersides of gravel; 40 percent gravel; slightly alkaline; clear wavy boundary.

Bk2—5 to 10 inches; brown (7.5YR 5/3) very gravelly loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable; many very fine roots; common very fine tubular pores; violently effervescent (27 percent calcium carbonate equivalent); lime accumulations as coatings on undersides of gravel; 40 percent gravel; moderately alkaline; abrupt wavy boundary.

Bk3—10 to 12 inches; brown (7.5YR 5/3) very gravelly loam, dark brown (7.5YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable; common very fine roots; common very fine tubular pores; violently effervescent, (36 percent calcium carbonate equivalent); lime accumulations as common fine soft masses and coatings on undersides of gravel; 40 percent gravel; moderately alkaline; abrupt smooth boundary.

2R—12 inches; limestone.

Range in Characteristics

Depth to bedrock: 7 to 20 inches
Average content of rock fragments in the control section: 35 to 65 percent gravel and cobble

B horizon:
Hue—7.5YR or 10YR
Value—3 through 5 dry; 3 moist
Chroma—2 or 3 dry or moist
Calcium carbonate equivalent—15 to 35 percent

References

American Association of State Highway and Transportation Officials. 1986. Standard specifications for highway materials and methods of sampling and testing. Ed. 14, 2 vols.

American Society for Testing and Materials. 1993. Standard classification of soils for engineering purposes. ASTM Stand. D 2487.

Portland Cement Association. 1973. PCA soil primer.

United States Department of Agriculture, Soil Conservation Service. 1993. Soil survey manual. Soil Surv. Staff, U.S. Dep. Agric. Handb. 18.

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210.

United States Department of Agriculture, Soil Conservation Service. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. U.S. Dep. Agric. Handb. 436.

Glossary

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Arroyo. The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.5
Low	2.5 to 5
Moderate	5 to 7.5
High	7.5 to 10
Very high	more than 10

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley

with high, precipitous walls in an area of high local relief.

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coppice dune. A small dune of fine grained soil material stabilized around shrubs or small trees.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, or clay.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone,

slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting

when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or subsurface lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition,

or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more

than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, the following slope classes are recognized:

Nearly level	0 to 3 percent
Gently sloping or undulating	3 to 7 percent
Strongly sloping or rolling	7 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 55 percent
Very steep	55 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2

millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the

earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1964-91 at Pipe Springs National Monument)

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average	Temperature: 2 years in 10 will have-- Maximum temperature higher than	Temperature: 2 years in 10 will have-- Minimum temperature lower than	Temperature: Average number of growing degree days*	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more
	^{o}F	^{o}F	^{o}F	^{o}F	^{o}F	Units	In	In	In	
January-----	47.6	21.0	34.3	68	-3	26	1.05	0.28	1.82	3
February----	53.7	24.4	39.1	72	4	62	0.98	0.21	1.65	3
March-------	60.3	29.4	44.9	79	12	173	1.04	0.33	1.70	3
April-------	68.7	34.6	51.6	85	17	341	0.70	0.20	1.20	2
May---------	78.7	42.4	60.6	94	26	609	0.57	0.15	0.94	1
June--------	89.6	50.9	70.3	104	37	872	0.36	0.13	0.72	1
July--------	94.4	58.6	76.5	105	45	1071	0.94	0.39	1.47	2
August------	91.4	56.8	74.1	102	44	984	1.36	0.53	2.05	3
September---	84.6	49.0	66.8	96	33	739	0.76	0.15	1.46	1
October-----	73.6	38.4	56.0	89	19	479	0.75	0.13	1.32	1
November----	58.7	28.9	43.8	77	10	158	1.02	0.29	1.67	2
December----	48.7	21.8	35.2	65	-2	30	0.86	0.33	1.57	2
Yearly:										
Average---	70.8	38.0	54.4	---	---	---	---	---	---	---
Extreme---	110	-13	---	105	-6	---	---	---	---	---
Total-----	---	---	---	---	---	5.546	10.38	7.96	12.31	24

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minumum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees. F)

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1964-91 at Pipe Springs National Monument)

	24 °F	28 °F	32 °F
Last freezing temperature in spring:			
1 year in 10 later than--	May 6	May 16	May 20
2 years in 10 later than--	April 26	May 10	May 17
5 years in 10 later than--	April 7	April 26	May 11
First freezing temperature in fall:			
1 year in 10 earlier than--	October 24	October 4	September 23
2 years in 10 earlier than--	October 28	October 10	September 30
5 years in 10 earlier than--	November 6	October 22	October 12

Table 3.--Growing Season

(Recorded in the period 1964-91 at Pipe Springs National Monument)
Five years between 1964 and 1991 have 25 days or more missing data.

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	157	142	127
8 years in 10	169	151	134
5 years in 10	193	167	149
2 years in 10	216	184	163
1 year in 10	228	193	171

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Coconino County	Mohave County	Total Area	Total Extent
		Acres	Acres	Acres	Pct
1	Badland	---	582	582	*
2	Barx fine sandy loam, 1 to 5 percent slopes	162	39,998	40,160	3.9
3	Barx loam, 1 to 4 percent slopes	---	2,459	2,459	0.2
4	Begay fine sandy loam, 1 to 3 percent slopes	---	3,501	3,501	0.3
5	Begay fine sandy loam, 3 to 12 percent slopes	---	6,163	6,163	0.6
6	Bidonia-Bond-Rock Outcrop complex, 1 to 25 percent slopes	---	24,289	24,289	2.3
7	Bond-Bidonia complex, 1 to 7 percent slopes	---	8,010	8,010	0.8
8	Brinkerhoff-Grieta complex, 0 to 5 percent slopes	---	4,582	4,582	0.4
9	Campanile clay, 1 to 6 percent slopes	---	3,033	3,033	0.3
10	Clayhole loam, 1 to 3 percent slopes	469	44,673	45,142	4.3
11	Curhollow-Prieta complex, 4 to 20 percent slopes	---	6,773	6,773	0.7
12	Godding gravelly loam, 3 to 40 percent slopes	---	3,981	3,981	0.4
13	Grieta fine sandy loam, 1 to 5 percent slopes	---	18,217	18,217	1.8
14	Grieta loam, 1 to 5 percent slopes	---	22,989	22,989	2.2
15	Gypsiorthids-Gypsiorthids, shallow complex, 1 to 50 percent slopes	---	43,190	43,190	4.2
16	Hatknoll-Kinan complex, 1 to 10 percent slopes	---	2,963	2,963	0.3
17	Havasupai-Mellenthin complex, 2 to 12 percent slopes	6,850	19,689	26,539	2.6
18	Jocity loamy fine sand, saline-sodic, 1 to 3 percent slopes	830	2,202	3,032	0.3
19	Jocity-Clayhole complex, 1 to 4 percent slopes	---	30,801	30,801	3.0
20	Jocity silty clay loam, 1 to 4 percent slopes	635	22,511	23,146	2.2
21	Jocity silty clay loam, 1 to 2 percent slopes, flooded	---	1,155	1,155	0.1
22	Kinan gravelly loam, 1 to 15 percent slopes	582	5,421	6,003	0.6
23	Kinan-Hatknoll-Grieta complex, 1 to 5 percent slopes	---	19,932	19,932	1.9
24	Kinan-Pennell complex, 1 to 20 percent slopes	---	10,633	10,633	1.0
25	Klondike sandy clay loam, 2 to 15 percent slopes	1,215	957	2,172	0.2
26	Lava flows	---	872	872	*
27	Lozinta extremely gravelly loam, 1 to 15 percent slopes	---	3,351	3,351	0.3
28	Lozinta extremely gravelly loam, 15 to 45 percent slopes	---	5,623	5,623	0.5
29	Manikan silty clay loam, 1 to 4 percent slopes	---	7,526	7,526	0.7
30	Mellenthin-Anasazi complex, 1 to 15 percent slopes	---	12,276	12,276	1.2
31	Mellenthin-Barx complex, 1 to 15 percent slopes	---	14,636	14,636	1.4
32	Mellenthin-Progresso complex, 1 to 7 percent slopes	---	9,758	9,758	0.9
33	Mellenthin very gravelly loam, 1 to 25 percent slopes	---	96,461	96,461	9.3
34	Mellenthin very gravelly loam, 30 to 50 percent slopes	---	1,887	1,887	0.2

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Coconino County	Mohave County	Total Area	Total Extent
		Acres	Acres	Acres	Pct
35	Mellenthin very gravelly loam, cool, 1 to 25 percent slopes	---	11,799	11,799	1.1
36	Mellenthin very gravelly loam, warm, 1 to 25 percent slopes	---	8,302	8,302	0.8
37	Mido fine sand, 1 to 10 percent slopes	---	9,171	9,171	0.9
38	Mido loamy fine sand, 1 to 4 percent slopes, gullied	---	5,702	5,702	0.5
39	Milok gravelly loam, 1 to 15 percent slopes	---	2,644	2,644	0.3
40	Moab loam, 1 to 5 percent slopes	---	10,639	10,639	1.0
41	Moab-Mellenthin complex, 1 to 20 percent slopes	---	8,894	8,894	0.9
42	Monue fine sandy loam, 1 to 5 percent slopes	---	10,901	10,901	1.1
43	Padilla-Penistaja-Campanile complex, 1 to 6 percent slopes	---	2,618	2,618	0.3
44	Palma loamy fine sand, 1 to 5 percent slopes	132	5,242	5,374	0.5
45	Penistaja fine sandy loam, 1 to 5 percent slopes	---	4,909	4,909	0.5
46	Pennell-Bacobi complex, 1 to 7 percent slopes	1,765	61,921	63,686	6.1
47	Pennell gravelly loam, 1 to 12 percent slopes	340	69,545	69,885	6.7
48	Poley cobbly silty clay loam, 1 to 5 percent slopes	---	8,553	8,553	0.8
49	Poley-Moab complex, 1 to 10 percent slopes	25	46,839	46,864	4.5
50	Radnik fine sandy loam, 1 to 5 percent slopes	---	637	637	*
51	Riverwash	---	79	79	*
52	Royosa fine sand, 2 to 10 percent slopes	---	1,120	1,120	0.1
53	Royosa-Tonalea complex, 1 to 15 percent slopes	90	18,121	18,211	1.8
54	Saido-Brinkerhoff complex, 1 to 5 percent slopes	---	58,248	58,248	5.6
55	Sheppard fine sand, 1 to 7 percent slopes	---	2,143	2,143	0.2
56	Sheppard loamy fine sand, 1 to 4 percent slopes, gullied	---	2,064	2,064	0.2
57	Showlow-Section complex, 1 to 15 percent slopes	---	13,631	13,631	1.3
58	Showlow-Thimble complex, 1 to 15 percent slopes	---	4,739	4,739	0.5
59	Showlow very cobbly clay loam, 1 to 15 percent slopes	---	19,834	19,834	1.9
60	Showlow very cobbly silty clay loam, 15 to 35 percent slopes	---	6,949	6,949	0.7
61	Sponiker gravelly loam, 1 to 15 percent slopes	---	6,263	6,263	0.6
62	Sponiker gravelly loam, 15 to 40 percent slopes	---	119	119	*
63	Torriorthents-Rock Outcrop complex, 30 to 70 percent slopes	---	59,955	59,955	5.8
64	Torriorthents-Rock Outcrop complex, dry, 30 to 70 percent slopes	---	11,175	11,175	1.1
65	Torriorthents-Rock Outcrop complex, warm, 30 to 70 percent slopes	60	1,027	1,087	0.1
66	Whiskey silt loam, 1 to 4 percent slopes	---	5,959	5,959	0.6
67	Wukoki-Lomaki complex, 15 to 50 percent slopes	---	4,131	4,131	0.4

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Coconino County	Mohave County	Total Area	Total Extent
		Acres	Acres	Acres	Pct
68	Wutoma-Lozinta complex, 1 to 15 percent slopes	---	560	560	*
69	Wutoma-Lozinta complex, 15 to 50 percent slopes	---	5,180	5,180	0.5
70	Wutoma-Rock Outcrop complex, 1 to 15 percent slopes	---	434	434	*
71	Yumtheska-Goesling complex, 1 to 15 percent slopes	---	4,113	4,113	0.4
72	Yumtheska very gravelly loam, 4 to 20 percent slopes	---	22,566	22,566	2.2
73	Yumtheska very gravelly loam, 30 to 50 percent slopes	---	7,170	7,170	0.7
	Total	13,155	1,024,990	1,038,145	100.0

* Less than 0.1 percent.

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
1:						
Badland						
2:						
Barx	Sandy Loam Upland 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	650	Hesperostipa comata ssp. comata		15
		Unfavorable	350	Pleuraphis jamesii		15
				Wyoming big sagebrush		5
				blue grama		30
				fourwing saltbush		5
				other shrubs		10
				sand dropseed		5
3:						
Barx	Loamy Upland 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	600	Hesperostipa comata ssp. comata		5
		Unfavorable	400	Indian ricegrass		10
				Pleuraphis jamesii		10
				Wyoming big sagebrush		10
				blue grama		20
				fourwing saltbush		5
				western wheatgrass		25
4:						
Begay	Sandy Loam Upland, Calcareous 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	600	Ephedra		10
		Unfavorable	400	Hesperostipa comata ssp. comata		10
				Indian ricegrass		20
				Pleuraphis jamesii		5
				black grama		5
				blue grama		20
				fourwing saltbush		5
5:						
Begay	Sandy Loam Upland, Moderately Deep, 10-14" p.z.	Favorable	700	Ephedra	5	
		Normal	550	Hesperostipa comata ssp. comata	5	
		Unfavorable	400	Indian ricegrass	10	
				Mexican cliffrose	10	
				Pleuraphis jamesii	5	
				Utah juniper	20	
				big sagebrush	10	
				twoneedle pinyon	5	
6:						
Bidonia	Sandstone Upland 10-14" p.z.	Favorable	600	Elymus elymoides ssp. elymoides	5	
		Normal	450	Hesperostipa comata ssp. comata	5	
		Unfavorable	300	Indian ricegrass	10	
				Stansbury cliffrose	5	
				Utah juniper	20	
				big sagebrush	20	
				blue grama	5	
				twoneedle pinyon	15	

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
6:						
Bond------------	Shallow Loamy 10-14" p.z.	Favorable	850	Elymus elymoides ssp. elymoides		5
		Normal	650	Hesperostipa comata ssp. comata		10
		Unfavorable	400	Indian ricegrass		10
				Pleuraphis jamesii		10
				big sagebrush		25
				black grama		5
				blue grama		10
				other perennial grasses		10
Rock Outcrop----						
7:						
Bond------------	Shallow Loamy 10-14" p.z.	Favorable	850	Elymus elymoides ssp. elymoides		5
		Normal	650	Hesperostipa comata ssp. comata		10
		Unfavorable	400	Indian ricegrass		10
				Pleuraphis jamesii		10
				big sagebrush		25
				black grama		5
				blue grama		10
				other perennial grasses		10
Bidonia---------	Sandstone Upland 10-14" p.z.	Favorable	850	Elymus elymoides ssp. elymoides	5	
		Normal	650	Hesperostipa comata ssp. comata	5	
		Unfavorable	400	Indian ricegrass	10	
				Stansbury cliffrose	5	
				Utah juniper	20	
				big sagebrush	20	
				blue grama	5	
				twoneedle pinyon	15	
8:						
Brinkerhoff-----	Sandy Loam Upland, Calcareous 7-11" p.z.	Favorable	1050	Hesperostipa comata ssp. comata		15
		Normal	850	Indian ricegrass		30
		Unfavorable	650	Pleuraphis jamesii		5
				blue grama		10
				desert needlegrass		15
				fourwing saltbush		10
Grieta----------	Sandy Loam Upland, Calcareous 7-11" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	750	Ephedra		5
		Unfavorable	600	Hesperostipa comata ssp. comata		20
				Indian ricegrass		20
				Pleuraphis jamesii		10
				black grama		5
				blue grama		20
				fourwing saltbush		5

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
9:						
Campanile-------	Clayey Upland 10-14" p.z.	Favorable	1000	Elymus elymoides ssp. elymoides		10
		Normal	750	Hesperostipa comata ssp. comata		5
		Unfavorable	400	Indian ricegrass		5
				Pleuraphis jamesii		5
				big sagebrush		10
				black grama		10
				blue grama		10
				other shrubs		5
				western wheatgrass		10
10:						
Clayhole--------	Gypsum Upland 7-11" p.z.	Favorable	650	Elymus elymoides ssp. elymoides		5
		Normal	550	Ephedra		5
		Unfavorable	450	Indian ricegrass		15
				Pleuraphis jamesii		25
				black grama		5
				fourwing saltbush		10
				gyp dropseed		10
				other perennial grasses		10
				shadscale saltbush		15
11:						
Curhollow-------	Basalt Upland 10-14" p.z.	Favorable	800	Elymus elymoides ssp. elymoides		5
		Normal	650	Hesperostipa comata ssp. comata		10
		Unfavorable	400	Mexican cliffrose		5
				New Mexico Feathergrass		10
				Pleuraphis jamesii		10
				big sagebrush		25
				black grama		5
				blue grama		10
				fernbush		5
				fourwing saltbush		5
				sideoats grama		5
Prieta----------	Basalt Upland 10-14" p.z.	Favorable	850	Elymus elymoides ssp. elymoides		5
		Normal	650	Hesperostipa comata ssp. comata		10
		Unfavorable	400	Indian ricegrass		10
				Pleuraphis jamesii		10
				big sagebrush		25
				black grama		5
				blue grama		10
12:						
Godding---------	Loamy Upland 17-22" p.z.	Favorable	900	Elymus elymoides ssp. elymoides	5	
		Normal	650	Utah juniper	5	
		Unfavorable	550	big sagebrush	15	
				blue grama	15	
				muttongrass	5	
				other perennial forbs	5	
				prairie Junegrass	5	
				sedge	5	
				twoneedle pinyon	5	

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
13:						
Grieta	Sandy Loam Upland 7-11" p.z.	Favorable	900	Ephedra		5
		Normal	700	Pleuraphis jamesii		15
		Unfavorable	500	blue grama		40
				dropseed		5
				other annual forbs		10
14:						
Grieta	Loamy Upland 7-11" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	750	Ephedra		5
		Unfavorable	600	Hesperostipa comata ssp. comata		10
				Indian ricegrass		15
				Pleuraphis jamesii		15
				blue grama		20
				fourwing saltbush		5
15:						
Gypsids	Gypsum Upland 7-11" p.z.	Favorable	650	Elymus elymoides ssp. elymoides		5
		Normal	550	Ephedra		5
		Unfavorable	450	Indian ricegrass		15
				Pleuraphis jamesii		25
				black grama		5
				fourwing saltbush		10
				gyp dropseed		10
				other perennial grasses		10
				shadscale saltbush		15
Gypsids, Shallow	Gypsum Hills 7-11" p.z.	Favorable	450	Bigelow sagebrush		10
		Normal	350	Ericameria nauseosa ssp. nauseosa var. nauseosa		5
		Unfavorable	250			
				Indian ricegrass		5
				Pleuraphis jamesii		5
				Stansbury cliffrose		5
				Utah serviceberry		5
				gyp dropseed		15
				other perennial forbs		5
				shadscale saltbush		15
16:						
Hatknoll	Clayey Upland 7-11" p.z.	Favorable	700	Elymus elymoides ssp. elymoides		5
		Normal	500	Ephedra		5
		Unfavorable	300	Ericameria nauseosa ssp. nauseosa var. nauseosa		5
				Indian ricegrass		5
				Pleuraphis jamesii		25
				black grama		5
				blue grama		5
				burrograss		5
				fourwing saltbush		5
				sand dropseed		5
				winterfat		5
Kinan	Loamy Upland 7-11" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	750	Ephedra		5
		Unfavorable	600	Hesperostipa comata ssp. comata		10
				Indian ricegrass		15
				Pleuraphis jamesii		15
				blue grama		20
				fourwing saltbush		5

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
17:						
Havasupai-------	Shallow Loamy 10-14" p.z.	Favorable	850	Elymus elymoides ssp. elymoides		5
		Normal	650	Hesperostipa comata ssp. comata		10
		Unfavorable	400	Indian ricegrass		10
				Pleuraphis jamesii		10
				big sagebrush		25
				black grama		5
				blue grama		10
17:						
Mellenthin------	Shallow Loamy 10-14" p.z.	Favorable	800	Hesperostipa comata ssp. comata		5
		Normal	650	Indian ricegrass		10
		Unfavorable	400	Pleuraphis jamesii		10
				big sagebrush		15
				black grama		5
				blue grama		10
				desert needlegrass		5
				fourwing saltbush		5
				western wheatgrass		5
				winterfat		5
18:						
Jocity----------	Saline Upland, Loamy 7-11" p.z.	Favorable	1000	Elymus elymoides ssp. elymoides		5
		Normal	800	Indian ricegrass		10
		Unfavorable	650	fourwing saltbush		10
				greasewood		10
				inland saltgrass		10
				shadscale saltbush		5
				western wheatgrass		10
19:						
Jocity----------	Silty Upland 7-11" p.z.	Favorable	750	Elymus elymoides ssp. elymoides		5
		Normal	650	Indian ricegrass		15
		Unfavorable	500	Pleuraphis jamesii		15
				fourwing saltbush		10
				sand dropseed		5
				shadscale saltbush		10
				winterfat		15
Clayhole--------	Gypsum Upland 7-11" p.z.	Favorable	650	Elymus elymoides ssp. elymoides		5
		Normal	550	Ephedra		5
		Unfavorable	450	Indian ricegrass		15
				Pleuraphis jamesii		25
				black grama		5
				fourwing saltbush		10
				gyp dropseed		10
				other perennial grasses		10
				shadscale saltbush		15
20:						
Jocity----------	Silty Upland 7-11" p.z.	Favorable	750	Elymus elymoides ssp. elymoides		5
		Normal	650	Indian ricegrass		15
		Unfavorable	500	Pleuraphis jamesii		15
				fourwing saltbush		10
				sand dropseed		5
				shadscale saltbush		10
				winterfat		15

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
21:						
Jocity	Clay Loam Bottom 7-11" p.z.	Favorable	1000	Indian ricegrass		10
		Normal	800	Pleuraphis jamesii		10
		Unfavorable	650	alkali sacaton		5
				blue grama		5
				fourwing saltbush		20
				mat muhly		5
				winterfat		10
22:						
Kinan	Loamy Upland 7-11" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	750	Ephedra		5
		Unfavorable	600	Hesperostipa comata ssp. comata		10
				Indian ricegrass		15
				Pleuraphis jamesii		15
				blue grama		20
				fourwing saltbush		5
23:						
Kinan	Loamy Upland 7-11" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	750	Ephedra		5
		Unfavorable	600	Hesperostipa comata ssp. comata		10
				Indian ricegrass		15
				Pleuraphis jamesii		15
				blue grama		20
				fourwing saltbush		5
Hatknoll	Clayey Upland 7-11" p.z.	Favorable	700	Elymus elymoides ssp. elymoides		5
		Normal	500	Ephedra		5
		Unfavorable	300	Ericameria nauseosa ssp. nauseosa var. nauseosa		5
				Indian ricegrass		5
				Pleuraphis jamesii		25
				black grama		5
				blue grama		5
				burrograss		5
				fourwing saltbush		5
				sand dropseed		5
				winterfat		5
Grieta	Loamy Upland 7-11" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	750	Ephedra		5
		Unfavorable	600	Hesperostipa comata ssp. comata		10
				Indian ricegrass		15
				Pleuraphis jamesii		15
				blue grama		20
				fourwing saltbush		5
24:						
Kinan	Loamy Upland 7-11" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	750	Ephedra		5
		Unfavorable	600	Hesperostipa comata ssp. comata		10
				Indian ricegrass		15
				Pleuraphis jamesii		15
				blue grama		20
				fourwing saltbush		5

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
24:						
Pennell---------	Shallow Loamy 7-11" p.z.	Favorable	700	Elymus elymoides ssp. elymoides		10
		Normal	500	Ephedra cutleri		5
		Unfavorable	300	Indian ricegrass		15
				Pleuraphis jamesii		10
				black grama		10
				blue grama		10
				fourwing saltbush		5
				sand dropseed		10
				winterfat		5
25:						
Klondike--------	Shallow Loamy 10-14" p.z.	Favorable	800	Elymus elymoides ssp. elymoides		5
		Normal	600	Ephedra		10
		Unfavorable	400	Hesperostipa comata ssp. comata		15
				Indian ricegrass		10
				Pleuraphis jamesii		10
				big sagebrush		10
				black grama		10
				blue grama		15
				other perennial forbs		5
				other perennial grasses		10
				winterfat		10
26:						
Lava Flows------						
27:						
Lozinta---------	Cinder Upland 14-18" p.z.	Favorable	1200	Elymus elymoides ssp. elymoides	10	
		Normal	800	Ephedra	10	
		Unfavorable	400	Hesperostipa comata ssp. comata	1	
				Pleuraphis jamesii	5	
				big sagebrush	10	
				blue grama	10	
				fourwing saltbush	10	
				muttongrass	10	
28:						
Lozinta---------	Cinder Hills 14-18" p.z.	Favorable	1100	Elymus elymoides ssp. elymoides	5	
		Normal	700	Ephedra	15	
		Unfavorable	300	Hesperostipa comata ssp. comata	1	
				Pleuraphis jamesii	5	
				big sagebrush	15	
				blue grama	5	
				fourwing saltbush	10	
				muttongrass	10	
				sideoats grama	5	

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
29:						
Manikan---------	Clayey Upland 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		10
		Normal	600	Hesperostipa comata ssp. comata		5
		Unfavorable	400	Indian ricegrass		5
				Pleuraphis jamesii		10
				big sagebrush		5
				black grama		10
				blue grama		25
				fourwing saltbush		10
				western wheatgrass		5
				winterfat		10
30:						
Mellenthin------	Shallow Loamy 10-14" p.z.	Favorable	800	Indian ricegrass	10	10
		Normal	650	Pleuraphis jamesii	10	10
		Unfavorable	400	big sagebrush	15	15
				black grama	5	5
				blue grama	10	10
				fourwing saltbush	5	5
				other perennial grasses	10	10
				western wheatgrass	5	5
Anasazi---------	Loamy Upland 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	600	Hesperostipa comata ssp. comata		5
		Unfavorable	400	Indian ricegrass		10
				Pleuraphis jamesii		10
				Wyoming big sagebrush		10
				blue grama		20
				western wheatgrass		25
31:						
Mellenthin------	Shallow Loamy 10-14" p.z.	Favorable	800	Indian ricegrass	10	10
		Normal	650	Pleuraphis jamesii	10	10
		Unfavorable	400	big sagebrush	15	15
				black grama	5	5
				blue grama	10	10
				fourwing saltbush	5	5
				other perennial grasses	10	10
				western wheatgrass	5	5
31:						
Barx------------	Loamy Upland 10-14" p.z.	Favorable	1000	Elymus elymoides ssp. elymoides		5
		Normal	750	Hesperostipa comata ssp. comata		5
		Unfavorable	500	Indian ricegrass		10
				Pleuraphis jamesii		10
				Wyoming big sagebrush		10
				blue grama		20
				fourwing saltbush		5
				other perennial grasses		5
				other shrubs		5
				western wheatgrass		25

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
32:						
Mellenthin------	Shallow Loamy 10-14" p.z.	Favorable	800	Indian ricegrass	10	10
		Normal	650	Pleuraphis jamesii	10	10
		Unfavorable	400	big sagebrush	15	15
				black grama	5	5
				blue grama	10	10
				fourwing saltbush	5	5
				other perennial grasses	10	10
				western wheatgrass	5	5
Progresso-------	Sandy Loam Upland, Calcareous 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	600	Ephedra		10
		Unfavorable	400	Hesperostipa comata ssp. comata		10
				Indian ricegrass		20
				Pleuraphis jamesii		5
				black grama		5
				blue grama		20
				fourwing saltbush		5
33:						
Mellenthin------	Shallow Loamy 10-14" p.z.	Favorable	800	Hesperostipa comata ssp. comata		5
		Normal	650	Indian ricegrass		10
		Unfavorable	400	Pleuraphis jamesii		10
				big sagebrush		15
				black grama		5
				blue grama		10
				desert needlegrass		5
				fourwing saltbush		5
				western wheatgrass		5
				winterfat		5
34:						
Mellenthin------	Limestone Breaks 10-14" p.z.	Favorable	550	Hesperostipa comata ssp. comata		5
		Normal	450	big sagebrush		20
		Unfavorable	350	blue grama		5
				desert needlegrass		5
				fourwing saltbush		5
				muttongrass		15
				other perennial grasses		5
35:						
Mellenthin------	Shallow Loamy 10-14" p.z.	Favorable	800	Hesperostipa comata ssp. comata		5
		Normal	650	Indian ricegrass		10
		Unfavorable	400	Pleuraphis jamesii		10
				big sagebrush		15
				black grama		5
				blue grama		10
				desert needlegrass		5
				fourwing saltbush		5
				western wheatgrass		5
				winterfat		5
36:						
Mellenthin------	Shallow Upland 10-14" p.z.	Favorable	700	blackbrush		
		Normal	450	yucca		
		Unfavorable	250	Mormon tea		

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
37:						
Mido------------	Sandy Upland 10-14" p.z.	Favorable	900	Ephedra		5
		Normal	650	Hesperostipa comata ssp. comata		10
		Unfavorable	400	Indian ricegrass		20
				blue grama		15
				dropseed		10
				fourwing saltbush		5
				other perennial forbs		5
				other perennial grasses		5
				sand buckwheat		2
				sand sagebrush		50
38:						
Mido------------	Sandy Upland 10-14" p.z.	Favorable	900	Ephedra		5
		Normal	650	Hesperostipa comata ssp. comata		10
		Unfavorable	400	Indian ricegrass		20
				blue grama		15
				dropseed		10
				fourwing saltbush		5
				other perennial forbs		5
				other perennial grasses		5
				sand buckwheat		2
				sand sagebrush		50
39:						
Milok-----------	Loamy Upland 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	600	Hesperostipa comata ssp. comata		5
		Unfavorable	400	Indian ricegrass		10
				Pleuraphis jamesii		10
				Wyoming big sagebrush		10
				blue grama		20
				fourwing saltbush		5
				muttongrass		5
				western wheatgrass		25
40:						
Moab------------	Loamy Upland 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	600	Ephedra		5
		Unfavorable	400	Hesperostipa comata ssp. comata		5
				Indian ricegrass		5
				Pleuraphis jamesii		5
				big sagebrush		10
				blue grama		15
				fourwing saltbush		5
				muttongrass		10
				other perennial forbs		5
				pricklypear and cholla		2
				western wheatgrass		20
				wolfberry		2
				yucca		2

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
41:						
Moab------------	Loamy Upland 10-14" p.z.	Favorable	900	Ephedra		5
		Normal	700	Indian ricegrass		15
		Unfavorable	400	Pleuraphis jamesii		15
				big sagebrush		15
				other annual forbs		5
				other perennial forbs		5
				other perennial grasses		5
				other shrubs		10
				western wheatgrass		10
Mellenthin------	Shallow Loamy 10-14" p.z.	Favorable	800	Hesperostipa comata ssp. comata		5
		Normal	650	Indian ricegrass		10
		Unfavorable	400	Pleuraphis jamesii		10
				big sagebrush		15
				black grama		5
				blue grama		10
				desert needlegrass		5
				fourwing saltbush		5
				western wheatgrass		5
				winterfat		5
42:						
Monue-----------	Sandy Loam Upland, Calcareous 7-11" p.z.	Favorable	900	Ephedra		10
		Normal	800	Indian ricegrass		10
		Unfavorable	650	Pleuraphis jamesii		5
				black grama		10
				fourwing saltbush		5
				globemallow		5
				mesa dropseed		5
				other perennial forbs		10
				other perennial grasses		15
				other shrubs		10
				sand dropseed		5
				spike dropseed		5
				winterfat		5
43:						
Padilla---------	Clayey Upland 10-14" p.z.	Favorable	1000	Elymus elymoides ssp. elymoides		10
		Normal	750	Hesperostipa comata ssp. comata		5
		Unfavorable	400	Indian ricegrass		5
				Pleuraphis jamesii		5
				big sagebrush		10
				black grama		10
				blue grama		10
				other shrubs		5
				western wheatgrass		10
Penistaja-------	Sandy Loam Upland, Calcareous 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	600	Ephedra		10
		Unfavorable	400	Hesperostipa comata ssp. comata		10
				Indian ricegrass		20
				Pleuraphis jamesii		5
				black grama		5
				blue grama		20
				fourwing saltbush		5

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
43:						
Campanile-------	Clayey Upland 10-14" p.z.	Favorable	1000	Elymus elymoides ssp. elymoides		10
		Normal	750	Hesperostipa comata ssp. comata		5
		Unfavorable	400	Indian ricegrass		5
				Pleuraphis jamesii		5
				big sagebrush		10
				black grama		10
				blue grama		10
				other shrubs		5
				western wheatgrass		10
44:						
Palma-----------	Sandy Loam Upland, Calcareous 10-14" p.z.	Favorable	800	Hesperostipa comata ssp. comata		15
		Normal	600	Indian ricegrass		20
		Unfavorable	400	Pleuraphis jamesii		10
				blue grama		25
				sand sagebrush		5
45:						
Penistaja-------	Sandy Loam Upland, Calcareous 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	600	Ephedra		10
		Unfavorable	400	Hesperostipa comata ssp. comata		10
				Indian ricegrass		20
				Pleuraphis jamesii		5
				black grama		5
				blue grama		20
				fourwing saltbush		5
46:						
Pennell---------	Shallow Loamy 7-11" p.z.	Favorable	700	Elymus elymoides ssp. elymoides		10
		Normal	500	Ephedra cutleri		5
		Unfavorable	300	Indian ricegrass		15
				Pleuraphis jamesii		10
				black grama		10
				blue grama		10
				fourwing saltbush		5
				sand dropseed		10
				winterfat		5
46:						
Bacobi----------	Loamy Upland 7-11" p.z.	Favorable	500	Elymus elymoides ssp. elymoides		3
		Normal	400	Indian ricegrass		15
		Unfavorable	200	Pleuraphis jamesii		20
				blue grama		25
				broom snakeweed		2
				fourwing saltbush		5
				other perennial forbs		5
				other perennial grasses		5
				other shrubs		5

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
47:						
Pennell	Shallow Loamy 7-11" p.z.	Favorable	700	Elymus elymoides ssp. elymoides		10
		Normal	500	Ephedra cutleri		5
		Unfavorable	300	Indian ricegrass		15
				Pleuraphis jamesii		10
				black grama		10
				blue grama		10
				fourwing saltbush		5
				sand dropseed		10
				winterfat		5
48:						
Poley	Clay Loam Upland 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	650	Hesperostipa comata ssp. comata		10
		Unfavorable	300	Indian ricegrass		10
				big sagebrush		15
				black grama		5
				fourwing saltbush		10
49:						
Poley	Clay Loam Upland 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	650	Hesperostipa comata ssp. comata		10
		Unfavorable	300	Indian ricegrass		10
				big sagebrush		15
				black grama		5
				fourwing saltbush		10
Moab	Loamy Upland 10-14" p.z.	Favorable	900	Ephedra		5
		Normal	700	Indian ricegrass		15
		Unfavorable	400	Pleuraphis jamesii		15
				big sagebrush		15
				other annual forbs		5
				other perennial forbs		5
				other perennial grasses		5
				other shrubs		10
				western wheatgrass		10
50:						
Radnik	Sandy Loam Upland, Calcareous 10-14" p.z.	Favorable	1200	Elymus elymoides ssp. elymoides		5
		Normal	750	Ephedra		10
		Unfavorable	400	Hesperostipa comata ssp. comata		5
				Indian ricegrass		20
				Pleuraphis jamesii		5
				black grama		5
				blue grama		20
				fourwing saltbush		5
51:						
Riverwash						

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
52:						
Royosa----------	Sandy Upland, Moderately Deep 14-18" p.z.	Favorable	1000	Gambel oak	5	5
		Normal	800	Indian ricegrass	10	10
		Unfavorable	650	Utah serviceberry	5	5
				antelope bitterbrush	5	5
				big sagebrush	20	20
				blue grama	5	5
				muttongrass	10	10
				other perennial forbs	5	5
				sandhill muhly	5	5
53:						
Royosa----------	Sandy Upland, Moderately Deep 14-18" p.z.	Favorable	775	Gambel oak	10	
		Normal	625	Indian ricegrass	5	
		Unfavorable	450	Mormon tea	5	
				Utah juniper	10	
				Utah serviceberry	5	
				antelope bitterbrush	5	
				big sagebrush	5	
				sand dropseed	5	
				sandhill muhly	5	
				twoneedle pinyon	10	
Tonalea---------	Sandy Upland, Moderately Deep 14-18" p.z.	Favorable	775	Gambel oak	10	
		Normal	625	Indian ricegrass	5	
		Unfavorable	450	Utah juniper	10	
				Wyoming big sagebrush	5	
				antelope bitterbrush	5	
				sand dropseed	5	
				sandhill muhly	5	
54:						
Saido-----------	Gypsum Upland 7-11" p.z.	Favorable	650	black grama		5
		Normal	550	bush muhly		5
		Unfavorable	450	fourwing saltbush		10
				gyp dropseed		10
Brinkerhoff-----	Loamy Upland 7-11" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	750	Ephedra		5
		Unfavorable	600	Hesperostipa comata ssp. comata		10
				Indian ricegrass		15
				Pleuraphis jamesii		15
				blue grama		20
				fourwing saltbush		5
55:						
Sheppard--------	Sandy Upland 7-11" p.z.	Favorable	700	Ephedra		5
		Normal	500	Hesperostipa comata ssp. comata		10
		Unfavorable	300	Indian ricegrass		25
				Pleuraphis jamesii		10
				black grama		5
				fourwing saltbush		10
				sand dropseed		10
				sand sagebrush		10

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
56:						
Sheppard--------	Sandy Upland 7-11" p.z.	Favorable	700	Ephedra		5
		Normal	500	Hesperostipa comata ssp. comata		10
		Unfavorable	300	Indian ricegrass		25
				Pleuraphis jamesii		10
				black grama		5
				fourwing saltbush		10
				sand dropseed		10
				sand sagebrush		10
57:						
Showlow---------	Clay Loam Upland 14-18" p.z.	Favorable	900	Elymus elymoides ssp. elymoides	5	
		Normal	600	Gambel oak	10	
		Unfavorable	500	Whipple cholla	5	
				blue grama	15	
				broom snakeweed	5	
				other perennial forbs	5	
				other perennial grasses	10	
				other shrubs	10	
				prairie Junegrass	5	
				pricklypear and cholla	5	
				sideoats grama	5	
				threeawn	5	
				western wheatgrass	20	
57:						
Section---------	Loamy Upland 14-18" p.z.	Favorable	900	Elymus elymoides ssp. elymoides	5	
		Normal	650	Ephedra	5	
		Unfavorable	550	Hesperostipa comata ssp. comata	20	
				Indian ricegrass	5	
				Mexican cliffrose	5	
				Pleuraphis jamesii	10	
				black grama	5	
				blue grama	30	
				fourwing saltbush	5	
				other annual forbs	1	
				other perennial forbs	1	
				other shrubs	1	
				winterfat	5	
58:						
Showlow---------	Clay Loam Upland 14-18" p.z.	Favorable	900	Elymus elymoides ssp. elymoides	5	
		Normal	600	Gambel oak	10	
		Unfavorable	500	Whipple cholla	5	
				blue grama	15	
				broom snakeweed	5	
				other perennial forbs	5	
				other perennial grasses	10	
				other shrubs	10	
				prairie Junegrass	5	
				pricklypear and cholla	5	
				sideoats grama	5	
				threeawn	5	
				western wheatgrass	20	

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
58:						
Thimble---------	Basalt Upland 14-18" p.z.	Favorable	600	Elymus elymoides ssp. elymoides	5	
		Normal	350	Stansbury cliffrose	5	
		Unfavorable	150	Utah juniper	5	
				banana yucca	5	
				blue grama	5	
				broom snakeweed	5	
				common wolfstail	5	
				muttongrass	10	
				other perennial forbs	5	
				prairie Junegrass	5	
				pricklypear and cholla	5	
				sideoats grama	15	
				skunkbush sumac	5	
				twoneedle pinyon	5	
				western wheatgrass	5	
59:						
Showlow---------	Clay Loam Upland 14-18" p.z.	Favorable	900	Elymus elymoides ssp. elymoides	5	
		Normal	600	Gambel oak	10	
		Unfavorable	500	Whipple cholla	5	
				blue grama	15	
				broom snakeweed	5	
				other perennial forbs	5	
				other perennial grasses	10	
				other shrubs	10	
				prairie Junegrass	5	
				pricklypear and cholla	5	
				sideoats grama	5	
				threeawn	5	
				western wheatgrass	20	
60:						
Showlow---------	Clay Loam Upland 14-18" p.z.	Favorable	900	Elymus elymoides ssp. elymoides	5	
		Normal	600	Gambel oak	10	
		Unfavorable	500	Whipple cholla	5	
				blue grama	15	
				broom snakeweed	5	
				other perennial forbs	5	
				other perennial grasses	10	
				other shrubs	10	
				prairie Junegrass	5	
				pricklypear and cholla	5	
				sideoats grama	5	
				threeawn	5	
				western wheatgrass	20	

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production		Characteristic vegetation	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/acre		Pct	Pct
61:						
Sponiker--------	Loamy Upland 17-25" p.z.	Favorable	1400	Elymus elymoides ssp. elymoides	5	
		Normal	950	Gambel oak	10	
		Unfavorable	750	New Mexico locust	5	
				Utah juniper	15	
				big sagebrush	10	
				blue grama	5	
				other perennial forbs	5	
				other perennial grasses	5	
				other shrubs	5	
				ponderosa pine	5	
				prairie Junegrass	5	
				twoneedle pinyon	5	
62:						
Sponiker--------	Loamy Upland 17-25" p.z.	Favorable	1400	Elymus elymoides ssp. elymoides	5	
		Normal	950	Gambel oak	10	
		Unfavorable	750	New Mexico locust	5	
				Utah juniper	15	
				big sagebrush	10	
				blue grama	5	
				other perennial forbs	5	
				other perennial grasses	5	
				other shrubs	5	
				ponderosa pine	5	
				prairie Junegrass	5	
				twoneedle pinyon	5	
63:						
Torriorthents---	Breaks 10-14" p.z.	Favorable	800	Ephedra		5
		Normal	600	Hesperostipa comata ssp. comata		15
		Unfavorable	400	Indian ricegrass		10
				Pleuraphis jamesii		5
				Utah juniper		10
				big sagebrush		10
				blue grama		10
				muttongrass		5
Rock Outcrop----						
64:						
Torriorthents---	Breaks 7-11" p.z.	Favorable	350	Elymus elymoides ssp. elymoides		5
		Normal	250	Ephedra		5
		Unfavorable	150	Ericameria nauseosa ssp. nauseosa var. nauseosa		5
				Hesperostipa comata ssp. comata		10
				Indian ricegrass		10
				Pleuraphis jamesii		10
				black grama		5
				desert needlegrass		15
				fourwing saltbush		5

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Site	Total production		Characteristic vegetation	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/acre		Pct	Pct
64:						
Rock Outcrop----						
65:						
Torriorthents---	Breaks 9-12" p.z.	Favorable	500	Bigelow sagebrush		5
		Normal	350	Indian ricegrass		15
		Unfavorable	200	Pleuraphis jamesii		5
				black grama		5
				bush muhly		5
				desert needlegrass		5
				other perennial forbs		5
				pricklypear and cholla		5
				sideoats grama		5
				threeawn		5
Rock Outcrop----						
Torriorthents---						
66:						
Whiskey---------	Loamy Upland 14-18" p.z.	Favorable	900	Ephedra		5
		Normal	650	Hesperostipa comata ssp. comata		15
		Unfavorable	550	Mexican cliffrose		5
				Pleuraphis jamesii		10
				Utah juniper		10
				blue grama		20
				fourwing saltbush		5
				winterfat		5
67:						
Wukoki----------	Cinder Hills 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	600	Hesperostipa comata ssp. comata		10
		Unfavorable	400	Pleuraphis jamesii		10
				Wyoming big sagebrush		10
				black grama		10
				blue grama		20
				pricklypear and cholla		2
				rabbitbrush		1
				sand dropseed		5
				sideoats grama		10
				threeawn		5
				winterfat		5

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Sie	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
67:						
Lomaki----------	Cinder Hills 10-14" p.z.	Favorable	900	Elymus elymoides ssp. elymoides		5
		Normal	600	Hesperostipa comata ssp. comata		10
		Unfavorable	400	Pleuraphis jamesii		10
				Wyoming big sagebrush		10
				black grama		10
				blue grama		20
				pricklypear and cholla		2
				rabbitbrush		1
				sand dropseed		5
				sideoats grama		10
				winterfat		5
68:						
Wutoma----------	Cinder Upland 14-18" p.z.	Favorable	1200	Elymus elymoides ssp. elymoides	10	
		Normal	800	Ephedra	10	
		Unfavorable	400	Hesperostipa comata ssp. comata	1	
				Pleuraphis jamesii	5	
				big sagebrush	10	
				blue grama	10	
				fourwing saltbush	10	
				muttongrass	10	
68:						
Lozinta---------	Cinder Upland 14-18" p.z.	Favorable	1200	Elymus elymoides ssp. elymoides	10	
		Normal	800	Ephedra	10	
		Unfavorable	400	Hesperostipa comata ssp. comata	1	
				Pleuraphis jamesii	5	
				big sagebrush	10	
				blue grama	10	
				fourwing saltbush	10	
				muttongrass	10	
69:						
Wutoma----------	Cinder Hills 14-18" p.z.	Favorable	1100	Elymus elymoides ssp. elymoides	5	
		Normal	700	Ephedra	15	
		Unfavorable	300	Hesperostipa comata ssp. comata	1	
				Pleuraphis jamesii	5	
				big sagebrush	15	
				blue grama	5	
				fourwing saltbush	10	
				muttongrass	10	
				sideoats grama	5	
Lozinta---------	Cinder Hills 14-18" p.z.	Favorable	1100	Elymus elymoides ssp. elymoides	5	
		Normal	700	Ephedra	15	
		Unfavorable	300	Hesperostipa comata ssp. comata	1	
				Pleuraphis jamesii	5	
				big sagebrush	15	
				blue grama	5	
				fourwing saltbush	10	
				muttongrass	10	
				sideoats grama	5	

Table 5.--Rangeland and Woodland Understory Production, Productivity, and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition: Forest	Composition: Range
			Lb/acre		Pct	Pct
70:						
Wutoma----------	Cinder Upland 14-18" p.z.	Favorable	1200	Elymus elymoides ssp. elymoides	10	
		Normal	800	Ephedra	10	
		Unfavorable	400	Hesperostipa comata ssp. comata	1	
				Pleuraphis jamesii	5	
				big sagebrush	10	
				blue grama	10	
				fourwing saltbush	10	
				muttongrass	10	
Rock Outcrop----						
71:						
Yumtheska-------	Shallow Loamy 14-18" p.z.	Favorable	950	Elymus elymoides ssp. elymoides	5	
		Normal	700	Hesperostipa comata ssp. comata	15	
		Unfavorable	600	Stansbury cliffrose	5	
				Utah juniper	10	
				big sagebrush	15	
				blue grama	25	
				twoneedle pinyon	15	
Goesling--------	Loamy Upland 14-18" p.z.	Favorable	900	Pleuraphis jamesii		5
		Normal	650	big sagebrush		25
		Unfavorable	550	blue grama		25
				fourwing saltbush		5
				needlegrass		15
72:						
Yumtheska-------	Shallow Loamy 14-18" p.z.	Favorable	950	Elymus elymoides ssp. elymoides	5	
		Normal	700	Hesperostipa comata ssp. comata	15	
		Unfavorable	600	Stansbury cliffrose	5	
				Utah juniper	10	
				big sagebrush	15	
				blue grama	25	
				twoneedle pinyon	15	
73:						
Yumtheska-------	Limestone Hills 14-18" p.z.	Favorable	900	Elymus elymoides ssp. elymoides	5	
		Normal	650	Hesperostipa comata ssp. comata	15	
		Unfavorable	500	Indian ricegrass	10	
				Pleuraphis jamesii	5	
				Stansbury cliffrose	5	
				Utah juniper	10	
				big sagebrush	15	
				blue grama	10	
				twoneedle pinyon	15	

Table 6.--Woodland Management and Productivity

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
1:										
Badland	---	---	---	---	---	---	---	---	---	---
2:										
Barx	---	---	---	---	---	---	---	---	---	---
3:										
Barx	---	---	---	---	---	---	---	---	---	---
4:										
Begay	---	---	---	---	---	---	---	---	---	---
5:										
Begay	0S	Moderate	Moderate	Severe	Slight	Moderate	Utah juniper	---	---	twoneedle pinyon
							twoneedle pinyon	30	---	
6:										
Bidonia	0D	Slight	Slight	Slight	---	Slight	Utah juniper	28	---	twoneedle pinyon
							twoneedle pinyon	---	---	
Bond	---	---	---	---	---	---	---	---	---	---
Rock Outcrop	---	---	---	---	---	---	---	---	---	---
7:										
Bond	---	---	---	---	---	---	---	---	---	---
Bidonia	0D	Slight	Slight	Slight	---	Slight	Utah juniper	28	---	twoneedle pinyon
							twoneedle pinyon	---	---	
8:										
Brinkerhoff	---	---	---	---	---	---	---	---	---	---
Grieta	---	---	---	---	---	---	---	---	---	---
9:										
Campanile	---	---	---	---	---	---	---	---	---	---
10:										
Clayhole	---	---	---	---	---	---	---	---	---	---

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
11:										
Curhollow	---	---	---	---	---	---	---	---	---	---
Prieta	---	---	---	---	---	---	---	---	---	---
12:										
Godding	4A	Slight	Slight	Moderate	Slight	Moderate	Utah juniper	---	---	ponderosa pine
							ponderosa pine	65	57	
13:										
Grieta	---	---	---	---	---	---	---	---	---	---
14:										
Grieta	---	---	---	---	---	---	---	---	---	---
15:										
Gypsids	---	---	---	---	---	---	---	---	---	---
Gypsids, Shallow	---	---	---	---	---	---	---	---	---	---
16:										
Hatknoll	---	---	---	---	---	---	---	---	---	---
Kinan	---	---	---	---	---	---	---	---	---	---
17:										
Havasupai	---	---	---	---	---	---	---	---	---	---
Mellenthin	---	---	---	---	---	---	---	---	---	---
18:										
Jocity	---	---	---	---	---	---	---	---	---	---
19:										
Jocity	---	---	---	---	---	---	---	---	---	---
Clayhole	---	---	---	---	---	---	---	---	---	---
20:										
Jocity	---	---	---	---	---	---	---	---	---	---
21:										
Jocity	---	---	---	---	---	---	---	---	---	---

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
22:										
Kinan	---	---	---	---	---	---	---	---	---	---
23:										
Kinan	---	---	---	---	---	---	---	---	---	---
Hatknoll	---	---	---	---	---	---	---	---	---	---
Grieta	---	---	---	---	---	---	---	---	---	---
24:										
Kinan	---	---	---	---	---	---	---	---	---	---
Pennell	---	---	---	---	---	---	---	---	---	---
25:										
Klondike	---	---	---	---	---	---	---	---	---	---
26:										
Lava Flows	---	---	---	---	---	---	---	---	---	---
27:										
Lozinta	0S	Slight	Slight	Slight	---	Moderate	Utah juniper	25	---	twoneedle pinyon
							twoneedle pinyon	---	---	
28:										
Lozinta	0R	Severe	Moderate	Slight	---	Moderate	Utah juniper	20	---	twoneedle pinyon
							twoneedle pinyon	---	---	
29:										
Manikan	---	---	---	---	---	---	---	---	---	---
30:										
Mellenthin	---	---	---	---	---	---	---	---	---	---
Anasazi	---	---	---	---	---	---	---	---	---	---
31:										
Mellenthin	---	---	---	---	---	---	---	---	---	---
Barx	---	---	---	---	---	---	---	---	---	---
32:										
Mellenthin	---	---	---	---	---	---	---	---	---	---

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
Progresso	---	---	---	---	---	---	---	---	---	---
33:										
Mellenthin	---	---	---	---	---	---	---	---	---	---
34:										
Mellenthin	---	---	---	---	---	---	---	---	---	---
35:										
Mellenthin	---	---	---	---	---	---	---	---	---	---
36:										
Mellenthin	---	---	---	---	---	---	---	---	---	---
37:										
Mido	---	---	---	---	---	---	---	---	---	---
38:										
Mido	---	---	---	---	---	---	---	---	---	---
39:										
Milok	---	---	---	---	---	---	---	---	---	---
40:										
Moab	---	---	---	---	---	---	---	---	---	---
41:										
Moab	---	---	---	---	---	---	---	---	---	---
Mellenthin	---	---	---	---	---	---	---	---	---	---
42:										
Monue	---	---	---	---	---	---	---	---	---	---
43:										
Padilla	---	---	---	---	---	---	---	---	---	---
Penistaja	---	---	---	---	---	---	---	---	---	---
Campanile	---	---	---	---	---	---	---	---	---	---
44:										
Palma	---	---	---	---	---	---	---	---	---	---

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
45:										
Penistaja	---	---	---	---	---	---	---	---	---	---
46:										
Pennell	---	---	---	---	---	---	---	---	---	---
Bacobi	---	---	---	---	---	---	---	---	---	---
47:										
Pennell	---	---	---	---	---	---	---	---	---	---
48:										
Poley	---	---	---	---	---	---	---	---	---	---
49:										
Poley	---	---	---	---	---	---	---	---	---	---
Moab	---	---	---	---	---	---	---	---	---	---
50:										
Radnik	---	---	---	---	---	---	---	---	---	---
51:										
Riverwash	---	---	---	---	---	---	---	---	---	---
52:										
Royosa	0S	Slight	Slight	Moderate	Slight	Moderate	Utah juniper	---	---	twoneedle pinyon
							twoneedle pinyon	32	---	
53:										
Royosa	0S	Slight	Slight	Moderate	Slight	Moderate	Utah juniper	---	---	twoneedle pinyon
							twoneedle pinyon	32	---	
Tonalea	0S	Slight	Moderate	Moderate	Slight	Moderate	Utah juniper	---	---	twoneedle pinyon
							twoneedle pinyon	32	---	
54:										
Saido	---	---	---	---	---	---	---	---	---	---
Brinkerhoff	---	---	---	---	---	---	---	---	---	---
55:										
Sheppard	---	---	---	---	---	---	---	---	---	---

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Plant competi-tion	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
56:										
Sheppard----------------	---	---	---	---	---	---	---	---	---	---
57:										
Showlow-----------------	0C	Slight	Slight	Slight	---	Slight	Utah juniper--------	60	---	---
							Utah juniper--------	60	---	
Section-----------------	0A	Slight	Slight	Slight	---	Slight	juniper-------------	---	---	twoneedle pinyon
							twoneedle pinyon----	52	---	
58:										
Showlow-----------------	0C	Slight	Slight	Slight	---	Slight	Utah juniper--------	60	---	---
Thimble-----------------	0R	Severe	Severe	Moderate	Slight	Severe	Utah juniper--------	---	---	twoneedle pinyon
							twoneedle pinyon----	40	---	
59:										
Showlow-----------------	0C	Slight	Slight	Slight	---	Slight	Utah juniper--------	60	---	---
							Utah juniper--------	60	---	
60:										
Showlow-----------------	0R	Moderate	Moderate	Slight	---	Slight	Utah juniper--------	60	---	---
							Utah juniper--------	60	---	
61:										
Sponiker----------------	4A	Slight	Slight	Moderate	Slight	Moderate	Utah juniper--------	---	---	ponderosa pine
							ponderosa pine------	65	57	
							twoneedle pinyon----	---	---	
62:										
Sponiker----------------	4R	Moderate	Moderate	Slight	Slight	Slight	Utah juniper--------	---	---	ponderosa pine
							ponderosa pine------	65	57	
63:										
Torriorthents-----------	---	---	---	---	---	---	---	---	---	---
Rock Outcrop------------	---	---	---	---	---	---	---	---	---	---
64:										
Torriorthents-----------	---	---	---	---	---	---	---	---	---	---
Rock Outcrop------------	---	---	---	---	---	---	---	---	---	---

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
65:										
Torriorthents-----------	---	---	---	---	---	---	---	---	---	---
Rock Outcrop------------	---	---	---	---	---	---	---	---	---	---
Torriorthents-----------	---	---	---	---	---	---	---	---	---	---
66:										
Whiskey-----------------	---	---	---	---	---	---	---	---	---	---
67:										
Wukoki------------------	---	---	---	---	---	---	---	---	---	---
Lomaki------------------	---	---	---	---	---	---	---	---	---	---
68:										
Wutoma------------------	0S	Slight	Slight	Slight	---	Moderate	Utah juniper-------- twoneedle pinyon----	25 ---	--- ---	twoneedle pinyon
Lozinta-----------------	0S	Slight	Slight	Slight	---	Moderate	Utah juniper-------- twoneedle pinyon----	25 ---	--- ---	twoneedle pinyon
69:										
Wutoma------------------	0R	Severe	Moderate	Slight	---	Moderate	Utah juniper-------- twoneedle pinyon----	20 ---	--- ---	twoneedle pinyon
Lozinta-----------------	0R	Severe	Moderate	Slight	---	Moderate	Utah juniper-------- twoneedle pinyon----	20 ---	--- ---	twoneedle pinyon
70:										
Wutoma------------------	0S	Slight	Slight	Slight	---	Moderate	Utah juniper-------- twoneedle pinyon----	25 ---	--- ---	twoneedle pinyon
Rock Outcrop------------	---	---	---	---	---	---	---	---	---	---
71:										
Yumtheska---------------	0D	Moderate	Moderate	Moderate	---	Moderate	Utah juniper-------- twoneedle pinyon----	--- 46	--- ---	twoneedle pinyon
Goesling----------------	---	---	---	---	---	---	---	---	---	---
72:										
Yumtheska---------------	0D	Moderate	Moderate	Moderate	---	Moderate	Utah juniper-------- twoneedle pinyon----	--- 46	--- ---	twoneedle pinyon

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi- nation symbol	Management concerns: Erosion hazard	Management concerns: Equip- ment limita- tion	Management concerns: Seedling mortal- ity	Management concerns: Wind- throw hazard	Management concerns: Plant competi- tion	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
73:										
Yumtheska---------------	0R	Moderate	Severe	Moderate	---	Moderate	Utah juniper--------	---	---	twoneedle pinyon
							twoneedle pinyon----	46	---	

Table 7.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1:					
Badland	---	---	---	---	---
2:					
Barx	Slight	Slight	Moderate: slope	Severe: erodes easily	Slight
3:					
Barx	Moderate: dusty	Moderate: dusty	Moderate: slope small stones	Slight	Slight
4:					
Begay	Slight	Slight	Moderate: slope	Severe: erodes easily	Slight
5:					
Begay	Slight	Slight	Severe: slope	Severe: erodes easily	Slight
6:					
Bidonia	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: small stones	Severe: small stones depth to rock
Bond	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Slight	Severe: depth to rock
Rock Outcrop	---	---	---	---	---
7:					
Bond	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Severe: depth to rock
Bidonia	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Severe: depth to rock
8:					
Brinkerhoff	Slight	Slight	Moderate: slope small stones	Slight	Moderate: droughty
Grieta	Slight	Slight	Moderate: slope small stones	Slight	Slight
9:					
Campanile	Moderate: too clayey	Moderate: too clayey	Moderate: slope too clayey	Moderate: too clayey	Severe: too clayey
10:					
Clayhole	Severe: flooding	Moderate: dusty	Moderate: dusty slope small stones	Moderate: dusty	Slight

Table 7.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
11:					
Curhollow	Severe: cemented pan depth to rock	Severe: cemented pan depth to rock	Severe: slope small stones depth to rock	Moderate: dusty	Severe: depth to rock
Prieta	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: slope small stones depth to rock	Severe: small stones	Severe: small stones depth to rock
12:					
Godding	Severe: slope	Severe: slope	Severe: slope small stones	Moderate: slope	Severe: slope
13:					
Grieta	Slight	Slight	Moderate: slope small stones	Slight	Slight
14:					
Grieta	Moderate: dusty	Moderate: dusty	Moderate: dusty slope small stones	Moderate: dusty	Slight
15:					
Gypsids	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Gypsids, Shallow	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
16:					
Hatknoll	Slight	Slight	Moderate: slope	Slight	Slight
Kinan	Moderate: dusty small stones	Moderate: dusty small stones	Severe: small stones	Moderate: dusty	Moderate: small stones
17:					
Havasupai	Severe: cemented pan small stones	Severe: cemented pan small stones	Severe: cemented pan small stones	Severe: small stones	Severe: small stones droughty
Mellenthin	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: slope small stones depth to rock	Severe: small stones	Severe: small stones droughty
18:					
Jocity	Severe: excess sodium flooding	Severe: excess sodium	Severe: excess sodium	Slight	Severe: excess sodium
19:					
Jocity	Severe: flooding	Slight	Moderate: slope	Slight	Slight

Table 7.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
19: Clayhole	Severe: flooding	Slight	Moderate: slope small stones	Slight	Slight
20: Jocity	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope	Slight	Slight
21: Jocity	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
22: Kinan	Moderate: dusty slope small stones	Moderate: dusty slope small stones	Severe: slope small stones	Moderate: dusty	Moderate: slope small stones
23: Kinan	Moderate: dusty	Moderate: dusty	Moderate: dusty slope small stones	Moderate: dusty	Slight
Hatknoll	Slight	Slight	Moderate: slope	Slight	Slight
Grieta	Moderate: dusty	Moderate: dusty	Moderate: dusty slope small stones	Moderate: dusty	Slight
24: Kinan	Moderate: dusty small stones	Moderate: dusty small stones	Severe: small stones	Moderate: dusty	Moderate: small stones
Pennell	Severe: depth to rock	Severe: depth to rock	Severe: slope small stones depth to rock	Moderate: dusty	Severe: depth to rock
25: Klondike	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Slight	Severe: depth to rock
26: Lava Flows	---	---	---	---	---
27: Lozinta	Severe: small stones	Severe: small stones	Severe: slope small stones	Severe: small stones	Severe: small stones droughty
28: Lozinta	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones droughty

Table 7.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
29:					
Manikan	Slight	Slight	Moderate: slope	Slight	Slight
30:					
Mellenthin	Severe: depth to rock	Severe: depth to rock	Severe: slope small stones	Slight	Severe: depth to rock
Anasazi	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Moderate: small stones
31:					
Mellenthin	Severe: depth to rock	Severe: depth to rock	Severe: slope small stones	Moderate: dusty	Severe: depth to rock
Barx	Moderate: dusty small stones	Moderate: dusty small stones	Severe: small stones	Moderate: dusty	Moderate: small stones
32:					
Mellenthin	Severe: depth to rock	Severe: depth to rock	Severe: small stones	Moderate: dusty	Severe: depth to rock
Progresso	Slight	Slight	Moderate: slope small stones depth to rock	Slight	Moderate: depth to rock
33:					
Mellenthin	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: slope small stones depth to rock	Severe: small stones	Severe: small stones droughty
34:					
Mellenthin	Severe: slope small stones depth to rock	Severe: slope small stones depth to rock	Severe: slope small stones depth to rock	Severe: slope small stones	Severe: slope small stones droughty
35:					
Mellenthin	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: slope small stones depth to rock	Severe: small stones	Severe: small stones droughty
36:					
Mellenthin	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: slope small stones depth to rock	Severe: small stones	Severe: small stones droughty
37:					
Mido	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: droughty
38:					
Mido	Moderate: too sandy	Moderate: too sandy	Moderate: slope too sandy	Moderate: too sandy	Moderate: droughty

Table 7.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
39:					
Milok	Moderate: dusty slope small stones	Moderate: dusty slope small stones	Severe: slope small stones	Moderate: dusty	Moderate: slope small stones droughty
40:					
Moab	Moderate: dusty	Moderate: dusty	Moderate: dusty slope small stones	Moderate: dusty	Severe: droughty
41:					
Moab	Moderate: slope small stones	Moderate: slope small stones	Severe: slope small stones	Slight	Moderate: large stones small stones droughty
Mellenthin	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: slope small stones depth to rock	Severe: small stones	Severe: small stones droughty
42:					
Monue	Slight	Slight	Moderate: slope	Slight	Slight
43:					
Padilla	Moderate: too clayey	Moderate: too clayey	Moderate: slope	Moderate: too clayey	Severe: too clayey
Penistaja	Slight	Slight	Moderate: slope small stones	Slight	Slight
Campanile	Moderate: too clayey	Moderate: too clayey	Moderate: slope too clayey	Moderate: too clayey	Severe: too clayey
44:					
Palma	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
45:					
Penistaja	Slight	Slight	Moderate: slope small stones	Slight	Slight
46:					
Pennell	Severe: depth to rock	Severe: depth to rock	Severe: small stones depth to rock	Slight	Severe: depth to rock
Bacobi	Severe: excess sodium	Severe: excess sodium	Severe: excess sodium	Slight	Severe: excess sodium
47:					
Pennell	Severe: depth to rock	Severe: depth to rock	Severe: slope small stones depth to rock	Moderate: dusty	Severe: depth to rock

Table 7.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
48:					
Poley	Moderate: large stones	Moderate: large stones	Severe: large stones	Moderate: large stones	Severe: large stones
49:					
Poley	Severe: large stones	Severe: large stones	Severe: large stones small stones	Moderate: dusty large stones	Severe: large stones
Moab	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Moderate: large stones small stones droughty
50:					
Radnik	Severe: flooding	Slight	Moderate: slope small stones	Slight	Slight
51:					
Riverwash	---	---	---	---	---
52:					
Royosa	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: droughty
53:					
Royosa	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: droughty
Tonalea	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope depth to rock droughty
54:					
Saido	Moderate: dusty excess salt	Moderate: dusty excess salt	Moderate: dusty excess salt slope	Severe: erodes easily	Moderate: excess salt
Brinkerhoff	Moderate: dusty	Moderate: dusty	Moderate: dusty slope small stones	Moderate: dusty	Moderate: droughty
55:					
Sheppard	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: droughty
56:					
Sheppard	Moderate: too sandy	Moderate: too sandy	Moderate: slope too sandy	Moderate: too sandy	Moderate: droughty
57:					
Showlow	Severe: large stones	Severe: large stones	Severe: slope small stones	Severe: large stones	Severe: large stones

Table 7.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
57:					
Section	Moderate: dusty slope small stones	Moderate: dusty slope small stones	Severe: slope small stones	Moderate: dusty	Moderate: slope small stones
58:					
Showlow	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: large stones slope
Thimble	Severe: depth to rock	Severe: depth to rock	Severe: large stones slope small stones	Moderate: large stones	Severe: large stones depth to rock
59:					
Showlow	Severe: large stones	Severe: large stones	Severe: slope small stones	Severe: large stones	Severe: large stones
60:					
Showlow	Severe: large stones slope	Severe: large stones slope	Severe: slope small stones	Severe: large stones slope	Severe: large stones slope
61:					
Sponiker	Moderate: slope small stones	Moderate: slope small stones	Severe: slope small stones	Slight	Moderate: slope small stones
62:					
Sponiker	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
63:					
Torriorthents	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
Rock Outcrop	---	---	---	---	---
64:					
Torriorthents	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
Rock Outcrop	---	---	---	---	---
65:					
Torriorthents	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
Rock Outcrop	---	---	---	---	---
Torriorthents	---	---	---	---	---
66:					
Whiskey	Slight	Slight	Moderate: slope small stones	Slight	Slight

Table 7.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
67:					
Wukoki	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones
Lomaki	Severe: small stones	Severe: small stones	Severe: small stones	Severe: small stones	Severe: small stones droughty
68:					
Wutoma	Severe: small stones	Severe: small stones	Severe: slope small stones	Severe: small stones	Severe: small stones droughty
Lozinta	Severe: small stones	Severe: small stones	Severe: slope small stones	Severe: small stones	Severe: small stones droughty
69:					
Wutoma	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones droughty
Lozinta	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones droughty
70:					
Wutoma	Moderate: slope	Moderate: slope	Severe: slope	Slight	Severe: droughty
Rock Outcrop	---	---	---	---	---
71:					
Yumtheska	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: slope small stones depth to rock	Severe: small stones	Severe: small stones depth to rock
Goesling	Moderate: dusty	Moderate: dusty	Moderate: dusty slope	Severe: erodes easily	Slight
72:					
Yumtheska	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: slope small stones depth to rock	Severe: small stones	Severe: small stones depth to rock
73:					
Yumtheska	Severe: slope small stones depth to rock	Severe: slope small stones depth to rock	Severe: slope small stones depth to rock	Severe: slope small stones	Severe: slope small stones depth to rock

Table 8a.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Badland	100	Not rated		Not rated		Not rated	
2:							
Barx	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
3:							
Barx	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
4:							
Begay	90	Not limited		Not limited		Not limited	
5:							
Begay	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
6:							
Bidonia	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
Bond	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.96	Slope	0.96	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Rock Outcrop	15	Not rated		Not rated		Not rated	
7:							
Bond	65	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Bidonia	15	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.01

Table 8a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
8:							
Brinkerhoff	65	Not limited		Not limited		Not limited	
Grieta	20	Not limited		Not limited		Not limited	
9:							
Campanile	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	0.01
10:							
Clayhole	95	Not limited		Not limited		Not limited	
11:							
Curhollow	45	Somewhat limited		Very limited		Very limited	
		Depth to hard bedrock	0.79	Depth to hard bedrock	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Depth to hard bedrock	0.79
Prieta	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
12:							
Godding	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Content of large stones	0.56	Content of large stones	0.56	Content of large stones	0.56
13:							
Grieta	80	Not limited		Not limited		Not limited	
14:							
Grieta	80	Not limited		Not limited		Not limited	
15:							
Gypsids	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
Gypsids, Shallow	35	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
16:							
Hatknoll	50	Not limited		Not limited		Somewhat limited	
						Slope	0.48
Kinan	35	Not limited		Not limited		Somewhat limited	
						Slope	0.48

Table 8a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
17:							
Havasupai-----------	65	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Mellenthin----------	15	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
						Slope	0.86
18:							
Jocity--------------	80	Not limited		Not limited		Not limited	
19:							
Jocity--------------	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Clayhole------------	30	Not limited		Not limited		Not limited	
20:							
Jocity--------------	80	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
21:							
Jocity--------------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
22:							
Kinan---------------	80	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
23:							
Kinan---------------	50	Not limited		Not limited		Not limited	
Hatknoll------------	25	Not limited		Not limited		Not limited	
Grieta--------------	15	Not limited		Not limited		Not limited	
24:							
Kinan---------------	55	Not limited		Not limited		Somewhat limited	
						Slope	0.48
Pennell-------------	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.37	Slope	0.37	Slope	1.00
25:							
Klondike------------	75	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.04	Slope	0.04	Slope	1.00

Table 8a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
26:							
Lava Flows	100	Not rated		Not rated		Not rated	
27:							
Lozinta	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
28:							
Lozinta	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
29:							
Manikan	80	Not limited		Not limited		Not limited	
30:							
Mellenthin	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
Anasazi	40	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.42	Depth to hard bedrock	1.00	Slope	0.48
						Depth to hard bedrock	0.42
31:							
Mellenthin	45	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
Barx	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
32:							
Mellenthin	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
						Slope	0.01
Progresso	35	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to hard bedrock	1.00	Shrink-swell	0.50
		Depth to hard bedrock	0.42	Shrink-swell	0.50	Depth to hard bedrock	0.42
						Slope	0.01
33:							
Mellenthin	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.84	Slope	0.84	Slope	1.00

Table 8a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
34:							
Mellenthin----------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
35:							
Mellenthin----------	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.84	Slope	0.84	Slope	1.00
36:							
Mellenthin----------	80	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.84	Slope	0.84	Slope	1.00
37:							
Mido----------------	95	Not limited		Not limited		Somewhat limited	
						Slope	0.48
38:							
Mido----------------	90	Not limited		Not limited		Not limited	
39:							
Milok---------------	80	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
40:							
Moab----------------	75	Not limited		Not limited		Not limited	
41:							
Moab----------------	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
Mellenthin----------	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.37	Slope	0.37	Slope	1.00
42:							
Monue---------------	85	Not limited		Not limited		Not limited	
43:							
Padilla-------------	50	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Penistaja-----------	30	Not limited		Not limited		Not limited	
Campanile-----------	15	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	0.01

Table 8a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
44:							
Palma	85	Not limited		Not limited		Not limited	
45:							
Penistaja	95	Not limited		Not limited		Not limited	
46:							
Pennell	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
						Slope	0.01
Bacobi	35	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.42	Slope	0.01
47:							
Pennell	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
						Slope	0.86
48:							
Poley	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
49:							
Poley	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Moab	40	Not limited		Not limited		Somewhat limited	
						Slope	0.48
50:							
Radnik	95	Not limited		Not limited		Not limited	
51:							
Riverwash	100	Not rated		Not rated		Not rated	
52:							
Royosa	95	Not limited		Not limited		Somewhat limited	
						Slope	0.48
53:							
Royosa	65	Not limited		Not limited		Somewhat limited	
						Slope	0.48
Tonalea	25	Somewhat limited		Very limited		Very limited	
		Depth to hard bedrock	0.42	Depth to hard bedrock	1.00	Slope	1.00
		Slope	0.04	Slope	0.04	Depth to hard bedrock	0.42

Table 8a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
54:							
Saido	70	Not limited		Not limited		Not limited	
Brinkerhoff	20	Not limited		Not limited		Not limited	
55:							
Sheppard	90	Not limited		Not limited		Somewhat limited	
						Slope	0.01
56:							
Sheppard	90	Not limited		Not limited		Not limited	
57:							
Showlow	45	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
Section	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
58:							
Showlow	50	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
Thimble	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Shrink-swell	1.00	Depth to hard bedrock	1.00
		Shrink-swell	1.00	Depth to hard bedrock	1.00	Shrink-swell	1.00
		Content of large stones	0.89	Content of large stones	0.89	Slope	1.00
		Slope	0.01	Slope	0.01	Content of large stones	0.89
59:							
Showlow	75	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
60:							
Showlow	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Shrink-swell	1.00
61:							
Sponiker	75	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
62:							
Sponiker	75	Very limited		Very limited		Very limited	
		Slope	1.00	Shrink-swell	1.00	Slope	1.00
		Shrink-swell	1.00	Slope	1.00	Shrink-swell	1.00

Table 8a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
63:							
Torriorthents-------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	0.29	Depth to hard bedrock	1.00	Depth to hard bedrock	0.29
Rock Outcrop--------	45	Not rated		Not rated		Not rated	
64:							
Torriorthents-------	55	Not rated		Not rated		Not rated	
Rock Outcrop--------	45	Not rated		Not rated		Not rated	
65:							
Torriorthents-------	50	Not rated		Not rated		Not rated	
Rock Outcrop--------	45	Not rated		Not rated		Not rated	
Torriorthents-------	5	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
66:							
Whiskey-------------	85	Not limited		Not limited		Not limited	
67:							
Wukoki--------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Lomaki--------------	40	Not limited		Not limited		Somewhat limited	
						Slope	0.01
68:							
Wutoma--------------	70	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
Lozinta-------------	20	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
69:							
Wutoma--------------	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Lozinta-------------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Table 8a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
70:							
Wutoma	60	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
Rock Outcrop	30	Not rated		Not rated		Not rated	
71:							
Yumtheska	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
Goesling	25	Not limited		Not limited		Not limited	
72:							
Yumtheska	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	1.00
73:							
Yumtheska	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00

Table 8b.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
1:							
Badland	100	Not rated		Not rated		Not rated	
2:							
Barx	85	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
3:							
Barx	80	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
4:							
Begay	90	Not limited		Very limited		Not limited	
				Cutbanks cave	1.00		
5:							
Begay	85	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.01	Cutbanks cave	1.00	Slope	0.01
				Slope	0.01		
6:							
Bidonia	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Shrink-swell	0.50	Too clayey	0.50	Droughty	1.00
				Cutbanks cave	0.10	Gravel content	1.00
						Content of large stones	0.20
Bond	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.96	Slope	0.96	Droughty	0.99
		Shrink-swell	0.50	Cutbanks cave	0.10	Slope	0.96
						Gravel content	0.32
Rock Outcrop	15	Not rated		Not rated		Not rated	
7:							
Bond	65	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Shrink-swell	0.50	Cutbanks cave	0.10	Droughty	0.99

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
7:							
Bidonia	15	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Shrink-swell	0.50	Too clayey	0.50	Droughty	1.00
				Cutbanks cave	0.10		
8:							
Brinkerhoff	65	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Cutbanks cave	1.00	Droughty	0.61
Grieta	20	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
9:							
Campanile	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Too clayey	1.00
				Too clayey	0.50		
10:							
Clayhole	95	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
11:							
Curhollow	45	Somewhat limited		Very limited		Very limited	
		Depth to hard bedrock	0.79	Depth to hard bedrock	1.00	Droughty	1.00
		Slope	0.63	Slope	0.63	Depth to bedrock	0.80
				Cutbanks cave	0.10	Slope	0.63
						Gravel content	0.41
Prieta	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Droughty	1.00
		Shrink-swell	0.50	Too clayey	0.50	Gravel content	1.00
				Cutbanks cave	0.10	Slope	0.63
						Content of large stones	0.01
12:							
Godding	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Content of large stones	0.56	Gravel content	0.41
		Content of large stones	0.56	Too clayey	0.12	Droughty	0.01
				Cutbanks cave	0.10		
13:							
Grieta	80	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
14:							
Grieta	80	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
15:							
Gypsids	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Subsidence	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
Gypsids, Shallow	35	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	0.10		
16:							
Hatknoll	50	Not limited		Very limited		Not limited	
				Cutbanks cave	1.00		
				Too clayey	0.50		
Kinan	35	Not limited		Somewhat limited		Somewhat limited	
				Cutbanks cave	0.10	Gravel content	0.14
17:							
Havasupai	65	Somewhat limited		Very limited		Very limited	
		Frost action	0.50	Cutbanks cave	1.00	Droughty	1.00
						Gravel content	1.00
						Content of large stones	0.01
Mellenthin	15	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
				Cutbanks cave	0.10	Droughty	1.00
						Gravel content	1.00
						Content of large stones	0.01
18:							
Jocity	80	Not limited		Somewhat limited		Very limited	
				Cutbanks cave	0.10	Sodium content	1.00
						Droughty	0.01
19:							
Jocity	50	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
Clayhole	30	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
20:							
Jocity	80	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Too clayey	0.28		
				Cutbanks cave	0.10		
21:							
Jocity	80	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Shrink-swell	0.50	Cutbanks cave	0.10		
22:							
Kinan	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.01	Cutbanks cave	0.10	Gravel content	0.14
				Slope	0.01	Slope	0.01
23:							
Kinan	50	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
Hatknoll	25	Not limited		Very limited		Not limited	
				Cutbanks cave	1.00		
				Too clayey	0.50		
Grieta	15	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
24:							
Kinan	55	Not limited		Somewhat limited		Somewhat limited	
				Cutbanks cave	0.10	Gravel content	0.14
Pennell	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.37	Slope	0.37	Droughty	1.00
				Cutbanks cave	0.10	Slope	0.37
						Gravel content	0.02
25:							
Klondike	75	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Slope	0.04	Cutbanks cave	0.10	Droughty	1.00
				Slope	0.04	Slope	0.04
26:							
Lava Flows	100	Not rated		Not rated		Not rated	

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
27:							
Lozinta	85	Somewhat limited		Very limited		Very limited	
		Slope	0.01	Cutbanks cave	1.00	Gravel content	1.00
				Slope	0.01	Droughty	1.00
						Slope	0.01
28:							
Lozinta	80	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Gravel content	1.00
				Slope	1.00	Slope	1.00
						Droughty	1.00
29:							
Manikan	80	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
30:							
Mellenthin	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.01	Cutbanks cave	0.10	Droughty	1.00
				Slope	0.01	Gravel content	0.08
						Content of large stones	0.03
						Slope	0.01
Anasazi	40	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Depth to hard bedrock	1.00	Droughty	0.85
		Depth to hard bedrock	0.42	Cutbanks cave	1.00	Depth to bedrock	0.42
						Gravel content	0.29
						Content of large stones	0.03
31:							
Mellenthin	45	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.01	Cutbanks cave	0.10	Droughty	1.00
				Slope	0.01	Gravel content	0.41
						Slope	0.01
Barx	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Cutbanks cave	0.10	Gravel content	0.50
32:							
Mellenthin	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
				Cutbanks cave	0.10	Droughty	1.00
						Gravel content	0.41

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
32:							
Progresso-----------	35	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to hard bedrock	1.00	Depth to bedrock	0.42
		Depth to hard bedrock	0.42	Cutbanks cave	0.10		
33:							
Mellenthin----------	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.84	Slope	0.84	Droughty	1.00
				Cutbanks cave	0.10	Gravel content	1.00
						Slope	0.84
						Content of large stones	0.01
34:							
Mellenthin----------	85	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	0.10	Droughty	1.00
						Gravel content	1.00
						Content of large stones	0.01
35:							
Mellenthin----------	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.84	Slope	0.84	Droughty	1.00
				Cutbanks cave	0.10	Gravel content	1.00
						Slope	0.84
						Content of large stones	0.01
36:							
Mellenthin----------	80	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.84	Slope	0.84	Droughty	1.00
				Cutbanks cave	0.10	Gravel content	1.00
						Slope	0.84
						Content of large stones	0.01
37:							
Mido----------------	95	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.71

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
38:							
Mido	90	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.66
39:							
Milok	80	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.01	Cutbanks cave	1.00	Gravel content	0.32
				Slope	0.01	Slope	0.01
40:							
Moab	75	Not limited		Very limited		Very limited	
				Cutbanks cave	1.00	Carbonate content	1.00
						Droughty	0.78
						Content of large stones	0.01
41:							
Moab	50	Somewhat limited		Very limited		Very limited	
		Frost action	0.50	Cutbanks cave	1.00	Carbonate content	1.00
		Slope	0.37	Slope	0.37	Droughty	0.81
						Slope	0.37
						Gravel content	0.36
						Content of large stones	0.01
Mellenthin	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.37	Slope	0.37	Droughty	1.00
				Cutbanks cave	0.10	Gravel content	1.00
						Slope	0.37
						Content of large stones	0.01
42:							
Monue	85	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
43:							
Padilla	50	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.12	Too clayey	1.00
				Cutbanks cave	0.10		
Penistaja	30	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
Campanile	15	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Too clayey	1.00
				Too clayey	0.50		
44:							
Palma	85	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
45:							
Penistaja-----------	95	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
46:							
Pennell-------------	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
				Cutbanks cave	0.10	Droughty	1.00
						Gravel content	0.08
Bacobi--------------	35	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.42	Depth to bedrock	0.42
				Cutbanks cave	0.10		
47:							
Pennell-------------	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
				Cutbanks cave	0.10	Droughty	1.00
						Gravel content	0.02
48:							
Poley---------------	75	Somewhat limited		Very limited		Very limited	
		Shrink-swell	0.50	Cutbanks cave	1.00	Content of large stones	1.00
				Too clayey	0.06		
49:							
Poley---------------	40	Somewhat limited		Very limited		Very limited	
		Shrink-swell	0.50	Cutbanks cave	1.00	Content of large stones	1.00
				Too clayey	0.06		
Moab----------------	40	Somewhat limited		Very limited		Very limited	
		Frost action	0.50	Cutbanks cave	1.00	Carbonate content	1.00
						Droughty	0.81
						Gravel content	0.36
						Content of large stones	0.01
50:							
Radnik--------------	95	Not limited		Somewhat limited		Somewhat limited	
				Cutbanks cave	0.10	Content of large stones	0.01
51:							
Riverwash-----------	100	Not rated		Not rated		Not rated	

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
52:							
Royosa	95	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.71
53:							
Royosa	65	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.71
Tonalea	25	Somewhat limited		Very limited		Very limited	
		Depth to hard bedrock	0.42	Depth to hard bedrock	1.00	Droughty	1.00
		Slope	0.04	Cutbanks cave	1.00	Depth to bedrock	0.42
				Slope	0.04	Slope	0.04
54:							
Saido	70	Not limited		Somewhat limited		Somewhat limited	
				Cutbanks cave	0.10	Salinity	0.13
Brinkerhoff	20	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Cutbanks cave	1.00	Droughty	0.50
55:							
Sheppard	90	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.71
56:							
Sheppard	90	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.69
57:							
Showlow	45	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Content of large stones	1.00
		Slope	0.01	Too clayey	0.28	Slope	0.01
				Slope	0.01		
Section	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.01	Cutbanks cave	0.10	Gravel content	0.50
				Slope	0.01	Slope	0.01
58:							
Showlow	50	Very limited		Very limited		Somewhat limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Slope	0.01
		Slope	0.01	Too clayey	0.28	Content of large stones	0.01
				Slope	0.01		
Thimble	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Shrink-swell	1.00	Content of large stones	0.89	Droughty	1.00
		Content of large stones	0.89	Too clayey	0.50	Content of large stones	1.00
		Slope	0.01	Cutbanks cave	0.10	Slope	0.01
				Slope	0.01		

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
59:							
Showlow-------------	75	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Content of large stones	1.00
		Slope	0.01	Too clayey	0.28	Slope	0.01
				Slope	0.01		
60:							
Showlow-------------	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Content of large stones	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
				Too clayey	0.28		
61:							
Sponiker------------	75	Very limited		Somewhat limited		Somewhat limited	
		Shrink-swell	1.00	Too clayey	0.50	Gravel content	0.36
		Slope	0.01	Cutbanks cave	0.10	Slope	0.01
				Slope	0.01	Content of large stones	0.01
62:							
Sponiker------------	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	1.00	Too clayey	0.50	Gravel content	0.36
				Cutbanks cave	0.10	Content of large stones	0.01
63:							
Torriorthents-------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Depth to hard bedrock	0.29	Slope	1.00	Depth to bedrock	0.29
				Cutbanks cave	0.10		
Rock Outcrop--------	45	Not rated		Not rated		Not rated	
64:							
Torriorthents-------	55	Not rated		Not rated		Not rated	
Rock Outcrop--------	45	Not rated		Not rated		Not rated	

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
65:							
Torriorthents	50	Not rated		Not rated		Not rated	
Rock Outcrop	45	Not rated		Not rated		Not rated	
Torriorthents	5	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
66:							
Whiskey	85	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
67:							
Wukoki	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
				Cutbanks cave	0.10	Slope	1.00
						Droughty	1.00
Lomaki	40	Not limited		Very limited		Very limited	
				Cutbanks cave	1.00	Gravel content	1.00
						Droughty	0.87
68:							
Wutoma	70	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Cutbanks cave	0.10	Gravel content	1.00
				Slope	0.01	Droughty	1.00
						Slope	0.01
Lozinta	20	Somewhat limited		Very limited		Very limited	
		Slope	0.01	Cutbanks cave	1.00	Gravel content	1.00
				Slope	0.01	Droughty	1.00
						Slope	0.01
69:							
Wutoma	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
				Cutbanks cave	0.10	Slope	1.00
						Droughty	1.00
Lozinta	30	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Gravel content	1.00
				Slope	1.00	Slope	1.00
						Droughty	1.00

Table 8b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
70:							
Wutoma--------------	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.01	Cutbanks cave	0.10	Droughty	0.95
				Slope	0.01	Content of large stones	0.84
						Slope	0.01
Rock Outcrop--------	30	Not rated		Not rated		Not rated	
71:							
Yumtheska-----------	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.01	Cutbanks cave	0.10	Droughty	1.00
				Slope	0.01	Gravel content	1.00
						Slope	0.01
						Content of large stones	0.01
Goesling------------	25	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
72:							
Yumtheska-----------	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Droughty	1.00
				Cutbanks cave	0.10	Gravel content	1.00
						Slope	0.63
						Content of large stones	0.01
73:							
Yumtheska-----------	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	0.10	Droughty	1.00
						Gravel content	1.00
						Content of large stones	0.01

Table 9a.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1:					
Badland	100	Not rated		Not rated	
2:					
Barx	85	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09
3:					
Barx	80	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09
4:					
Begay	90	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.01
5:					
Begay	85	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Slope	0.01	Slope	1.00
6:					
Bidonia	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.67
Bond	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.96	Slope	1.00
Rock Outcrop	15	Not rated		Not rated	
7:					
Bond	65	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.09

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
7:					
Bidonia-------------	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.33
8:					
Brinkerhoff---------	65	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
Grieta--------------	20	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09
9:					
Campanile-----------	80	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.33
10:					
Clayhole------------	95	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.01
11:					
Curhollow-----------	45	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.63	Slope	1.00
Prieta--------------	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.63	Slope	1.00
12:					
Godding-------------	80	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00	Content of large stones	0.12
		Content of large stones	0.56		
13:					
Grieta--------------	80	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
14:					
Grieta	80	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09
15:					
Gypsids	60	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Gypsids, Shallow	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
16:					
Hatknoll	50	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.91
				Seepage	0.50
Kinan	35	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Slope	0.91
				Seepage	0.50
17:					
Havasupai	65	Not limited		Very limited	
				Seepage	1.00
				Slope	0.67
Mellenthin	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	1.00
				Seepage	0.50
18:					
Jocity	80	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.01
19:					
Jocity	50	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.09
Clayhole	30	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
20:					
Jocity	80	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
				Slope	0.09
21:					
Jocity	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Slope	0.01
22:					
Kinan	80	Somewhat limited		Very limited	
		Restricted permeability	0.50	Slope	1.00
		Slope	0.01	Seepage	0.50
23:					
Kinan	50	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09
Hatknoll	25	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.50
				Slope	0.09
Grieta	15	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09
24:					
Kinan	55	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Slope	0.91
				Seepage	0.50
Pennell	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.37	Slope	1.00
25:					
Klondike	75	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.04	Slope	1.00
				Seepage	0.32

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
26:					
Lava Flows----------	100	Not rated		Not rated	
27:					
Lozinta-------------	85	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.50	Slope	1.00
		Slope	0.01		
28:					
Lozinta-------------	80	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Restricted permeability	0.50		
29:					
Manikan-------------	80	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09
30:					
Mellenthin----------	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	1.00
				Seepage	0.50
Anasazi-------------	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	1.00
				Slope	0.91
31:					
Mellenthin----------	45	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	1.00
				Seepage	0.50
Barx----------------	35	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Slope	0.67
				Seepage	0.50

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
32:					
Mellenthin----------	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	0.50
				Slope	0.33
Progresso-----------	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.33
33:					
Mellenthin----------	75	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.84	Slope	1.00
				Seepage	0.50
34:					
Mellenthin----------	85	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.50
35:					
Mellenthin----------	75	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.84	Slope	1.00
				Seepage	0.50
36:					
Mellenthin----------	80	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.84	Slope	1.00
				Seepage	0.50
37:					
Mido----------------	95	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.91
38:					
Mido----------------	90	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
39:					
Milok	80	Somewhat limited		Very limited	
		Slope	0.01	Seepage	1.00
				Slope	1.00
40:					
Moab	75	Not limited		Very limited	
				Seepage	1.00
				Slope	0.09
41:					
Moab	50	Somewhat limited		Very limited	
		Slope	0.37	Seepage	1.00
				Slope	1.00
Mellenthin	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.37	Slope	1.00
				Seepage	0.50
42:					
Monue	85	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
				Slope	0.09
43:					
Padilla	50	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.01
Penistaja	30	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
				Slope	0.01
Campanile	15	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.33
44:					
Palma	85	Not limited		Very limited	
				Seepage	1.00
				Slope	0.09
45:					
Penistaja	95	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
				Slope	0.09

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
46:					
Pennell-------------	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.33
Bacobi--------------	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	1.00	Seepage	1.00
				Slope	0.33
47:					
Pennell-------------	75	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	1.00
48:					
Poley---------------	75	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.50
				Slope	0.09
49:					
Poley---------------	40	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.50
				Slope	0.09
Moab----------------	40	Not limited		Very limited	
				Seepage	1.00
				Slope	0.91
50:					
Radnik--------------	95	Not limited		Very limited	
				Seepage	1.00
				Slope	0.09
51:					
Riverwash-----------	100	Not rated		Not rated	
52:					
Royosa--------------	95	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.91
53:					
Royosa--------------	65	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.91

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
53:					
Tonalea	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.04	Slope	1.00
54:					
Saido	70	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09
Brinkerhoff	20	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
55:					
Sheppard	90	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.33
56:					
Sheppard	90	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
57:					
Showlow	45	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.01	Seepage	0.50
Section	35	Somewhat limited		Very limited	
		Restricted permeability	0.50	Slope	1.00
		Slope	0.01	Seepage	0.50
58:					
Showlow	50	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.01	Seepage	0.50
Thimble	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Content of large stones	0.89	Content of large stones	1.00
		Slope	0.01	Slope	1.00

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
59:					
Showlow-------------	75	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.01	Seepage	0.50
60:					
Showlow-------------	80	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00	Seepage	0.50
61:					
Sponiker------------	75	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.01		
62:					
Sponiker------------	75	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00		
63:					
Torriorthents-------	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
Rock Outcrop--------	45	Not rated		Not rated	
64:					
Torriorthents-------	55	Not rated		Not rated	
Rock Outcrop--------	45	Not rated		Not rated	
65:					
Torriorthents-------	50	Not rated		Not rated	
Rock Outcrop--------	45	Not rated		Not rated	
Torriorthents-------	5	Very limited		Very limited	
		Slope	1.00	Slope	1.00

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
66:					
Whiskey	85	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09
67:					
Wukoki	45	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
Lomaki	40	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.50	Slope	0.33
68:					
Wutoma	70	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Slope	0.01	Slope	1.00
Lozinta	20	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.50	Slope	1.00
		Slope	0.01		
69:					
Wutoma	60	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
Lozinta	30	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Restricted permeability	0.50		
70:					
Wutoma	60	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Slope	0.01	Slope	1.00
Rock Outcrop	30	Not rated		Not rated	

Table 9a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
71:					
Yumtheska-----------	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	1.00
Goesling------------	25	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.09
72:					
Yumtheska-----------	75	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.63	Slope	1.00
73:					
Yumtheska-----------	75	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00

Table 9b.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Badland	100	Not rated		Not rated		Not rated	
2:							
Barx	85	Not limited		Not limited		Not limited	
3:							
Barx	80	Not limited		Not limited		Not limited	
4:							
Begay	90	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
5:							
Begay	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.01	Slope	0.01	Seepage	0.50
						Slope	0.01
6:							
Bidonia	35	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
Bond	30	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.96	Depth to bedrock	1.00
		Slope	0.96			Slope	0.96
Rock Outcrop	15	Not rated		Not rated		Not rated	
7:							
Bond	65	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
Bidonia	15	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
8:							
Brinkerhoff	65	Very limited		Not limited		Very limited	
		Too Sandy	1.00			Too Sandy	1.00
						Seepage	1.00
						Gravel content	0.01
Grieta	20	Not limited		Not limited		Not limited	
9:							
Campanile	80	Not limited		Not limited		Very limited	
						Hard to compact	1.00

Table 9b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
10:							
Clayhole------------	95	Not limited		Not limited		Not limited	
11:							
Curhollow-----------	45	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.63	Depth to bedrock	1.00
		Slope	0.63			Gravel content	0.96
						Slope	0.63
Prieta--------------	35	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.63	Depth to bedrock	1.00
		Slope	0.63			Gravel content	1.00
						Slope	0.63
12:							
Godding-------------	80	Very limited		Very limited		Very limited	
		Too clayey	1.00	Slope	1.00	Too clayey	1.00
		Slope	1.00			Slope	1.00
		Content of large stones	0.86			Hard to compact	1.00
						Content of large stones	0.86
13:							
Grieta--------------	80	Not limited		Not limited		Not limited	
14:							
Grieta--------------	80	Not limited		Not limited		Not limited	
15:							
Gypsids-------------	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Gypsids, Shallow----	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00	Depth to bedrock	1.00
		Slope	1.00			Slope	1.00
16:							
Hatknoll------------	50	Not limited		Not limited		Not limited	
Kinan---------------	35	Not limited		Not limited		Somewhat limited	
						Gravel content	0.01
17:							
Havasupai-----------	65	Not limited		Not limited		Very limited	
						Gravel content	1.00
Mellenthin----------	15	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Gravel content	1.00
18:							
Jocity--------------	80	Not limited		Not limited		Not limited	
19:							
Jocity--------------	50	Not limited		Not limited		Not limited	
Clayhole------------	30	Not limited		Not limited		Not limited	

Table 9b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
20:							
Jocity	80	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
21:							
Jocity	80	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
22:							
Kinan	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.01	Slope	0.01	Gravel content	0.01
						Slope	0.01
23:							
Kinan	50	Not limited		Not limited		Not limited	
Hatknoll	25	Not limited		Not limited		Not limited	
Grieta	15	Not limited		Not limited		Not limited	
24:							
Kinan	55	Not limited		Not limited		Somewhat limited	
						Gravel content	0.01
Pennell	35	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.37	Depth to bedrock	1.00
		Slope	0.37			Slope	0.37
25:							
Klondike	75	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.04	Depth to bedrock	1.00
		Slope	0.04			Slope	0.04
26:							
Lava Flows	100	Not rated		Not rated		Not rated	
27:							
Lozinta	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Slope	0.01	Slope	0.01	Gravel content	1.00
						Slope	0.01
28:							
Lozinta	80	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Slope	1.00	Slope	1.00	Gravel content	1.00
						Slope	1.00
29:							
Manikan	80	Not limited		Not limited		Not limited	

Table 9b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
30:							
Mellenthin----------	50	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.01	Depth to bedrock	1.00
		Slope	0.01			Gravel content	0.71
						Slope	0.01
Anasazi-------------	40	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	0.50
						Gravel content	0.01
31:							
Mellenthin----------	45	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.01	Depth to bedrock	1.00
		Slope	0.01			Gravel content	0.88
						Slope	0.01
Barx----------------	35	Not limited		Not limited		Not limited	
32:							
Mellenthin----------	50	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Gravel content	0.88
Progresso-----------	35	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
33:							
Mellenthin----------	75	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.84	Depth to bedrock	1.00
		Slope	0.84			Gravel content	1.00
						Slope	0.84
34:							
Mellenthin----------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00			Slope	1.00
						Gravel content	1.00
35:							
Mellenthin----------	75	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.84	Depth to bedrock	1.00
		Slope	0.84			Gravel content	1.00
						Slope	0.84
36:							
Mellenthin----------	80	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.84	Depth to bedrock	1.00
		Slope	0.84			Gravel content	1.00
						Slope	0.84
37:							
Mido----------------	95	Very limited		Not limited		Very limited	
		Too Sandy	1.00			Seepage	1.00
						Too Sandy	0.50

Table 9b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
38:							
Mido----------------	90	Very limited		Not limited		Very limited	
		Too Sandy	1.00			Seepage	1.00
						Too Sandy	0.50
39:							
Milok---------------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.01	Slope	0.01	Seepage	0.50
						Slope	0.01
40:							
Moab----------------	75	Not limited		Not limited		Very limited	
						Gravel content	1.00
						Carbonate content	1.00
						Seepage	0.50
41:							
Moab----------------	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Gravel content	1.00
						Carbonate content	1.00
						Seepage	0.50
						Slope	0.37
Mellenthin----------	30	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.37	Depth to bedrock	1.00
		Slope	0.37			Gravel content	1.00
						Slope	0.37
42:							
Monue---------------	85	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
43:							
Padilla-------------	50	Not limited		Not limited		Not limited	
Penistaja-----------	30	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
Campanile-----------	15	Not limited		Not limited		Very limited	
						Hard to compact	1.00
44:							
Palma---------------	85	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
45:							
Penistaja-----------	95	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
46:							
Pennell-------------	50	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
Bacobi--------------	35	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00

Table 9b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
47:							
Pennell	75	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
48:							
Poley	75	Not limited		Not limited		Not limited	
49:							
Poley	40	Not limited		Not limited		Not limited	
Moab	40	Not limited		Not limited		Very limited	
						Gravel content	1.00
						Carbonate content	1.00
						Seepage	0.50
50:							
Radnik	95	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
51:							
Riverwash	100	Not rated		Not rated		Not rated	
52:							
Royosa	95	Very limited		Not limited		Very limited	
		Too Sandy	1.00			Seepage	1.00
						Too Sandy	0.50
53:							
Royosa	65	Very limited		Not limited		Very limited	
		Too Sandy	1.00			Seepage	1.00
						Too Sandy	0.50
Tonalea	25	Very limited		Somewhat limited		Very limited	
		Depth to bedrock	1.00	Slope	0.04	Depth to bedrock	1.00
		Too Sandy	1.00			Too Sandy	1.00
		Slope	0.04			Seepage	1.00
						Slope	0.04
54:							
Saido	70	Not limited		Not limited		Not limited	
Brinkerhoff	20	Very limited		Not limited		Very limited	
		Too Sandy	1.00			Too Sandy	1.00
						Seepage	1.00
						Gravel content	0.01
55:							
Sheppard	90	Very limited		Not limited		Very limited	
		Too Sandy	1.00			Seepage	1.00
						Too Sandy	0.50
56:							
Sheppard	90	Very limited		Not limited		Very limited	
		Too Sandy	1.00			Seepage	1.00
						Too Sandy	0.50

Table 9b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
57:							
Showlow-------------	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Hard to compact	1.00
						Slope	0.01
Section-------------	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.01	Slope	0.01	Slope	0.01
58:							
Showlow-------------	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Hard to compact	1.00
						Slope	0.01
Thimble-------------	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	1.00	Slope	0.01	Too clayey	1.00
		Seepage	1.00			Content of large stones	0.89
		Content of large stones	0.89			Slope	0.01
		Slope	0.01				
59:							
Showlow-------------	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Hard to compact	1.00
						Slope	0.01
60:							
Showlow-------------	80	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Hard to compact	1.00
61:							
Sponiker------------	75	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Slope	0.01	Too clayey	1.00
		Slope	0.01			Hard to compact	1.00
						Gravel content	0.01
						Slope	0.01
62:							
Sponiker------------	75	Very limited		Very limited		Very limited	
		Too clayey	1.00	Slope	1.00	Too clayey	1.00
		Slope	1.00			Slope	1.00
						Hard to compact	1.00
						Gravel content	0.01
63:							
Torriorthents-------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00			Slope	1.00
Rock Outcrop--------	45	Not rated		Not rated		Not rated	

Table 9b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
64:							
Torriorthents	55	Not rated		Not rated		Not rated	
Rock Outcrop	45	Not rated		Not rated		Not rated	
65:							
Torriorthents	50	Not rated		Not rated		Not rated	
Rock Outcrop	45	Not rated		Not rated		Not rated	
Torriorthents	5	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
66:							
Whiskey	85	Not limited		Not limited		Not limited	
67:							
Wukoki	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Seepage	1.00
						Gravel content	1.00
						Slope	1.00
Lomaki	40	Not limited		Not limited		Very limited	
						Seepage	1.00
						Gravel content	1.00
68:							
Wutoma	70	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Slope	0.01	Slope	0.01	Gravel content	1.00
						Slope	0.01
Lozinta	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Slope	0.01	Slope	0.01	Gravel content	1.00
						Slope	0.01
69:							
Wutoma	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Slope	1.00	Slope	1.00	Gravel content	1.00
						Slope	1.00
Lozinta	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Slope	1.00	Slope	1.00	Gravel content	1.00
						Slope	1.00

Table 9b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70:							
Wutoma	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Slope	0.01	Slope	0.01	Gravel content	1.00
						Slope	0.01
Rock Outcrop	30	Not rated		Not rated		Not rated	
71:							
Yumtheska	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.01	Slope	0.01	Gravel content	1.00
						Too acid	1.00
						Slope	0.01
Goesling	25	Not limited		Not limited		Not limited	
72:							
Yumtheska	75	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Gravel content	1.00
						Too acid	1.00
						Slope	0.63
73:							
Yumtheska	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
						Gravel content	1.00
						Too acid	1.00

Table 10a.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
1:					
Badland	100	Not rated		Not rated	
2:					
Barx	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
3:					
Barx	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4:					
Begay	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.01
		Thickest layer	0.00	Thickest layer	0.01
5:					
Begay	85	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.01
		Thickest layer	0.00	Thickest layer	0.01
6:					
Bidonia	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Bond	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Rock Outcrop	15	Not rated		Not rated	
7:					
Bond	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Bidonia	15	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 10a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
8:					
Brinkerhoff---------	65	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.10
Grieta--------------	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
9:					
Campanile-----------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
10:					
Clayhole------------	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
11:					
Curhollow-----------	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Prieta--------------	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
12:					
Godding-------------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
13:					
Grieta--------------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
14:					
Grieta--------------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
15:					
Gypsids-------------	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Gypsids, Shallow----	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
16:					
Hatknoll------------	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 10a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Value	Potential source of sand: Rating class	Value
16:					
Kinan	35	Poor		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
17:					
Havasupai	65	Fair		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.75	Thickest layer	0.00
Mellenthin	15	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
18:					
Jocity	80	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.11
19:					
Jocity	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Clayhole	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
20:					
Jocity	80	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.03
21:					
Jocity	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
22:					
Kinan	80	Poor		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
23:					
Kinan	50	Poor		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Hatknoll	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Grieta	15	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 10a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Value	Potential source of sand: Rating class	Value
24:					
Kinan---------------	55	Poor		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Pennell-------------	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
25:					
Klondike------------	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
26:					
Lava Flows----------	100	Not rated		Not rated	
27:					
Lozinta-------------	85	Good		Poor	
		Thickest layer	0.62	Bottom layer	0.00
				Thickest layer	0.00
28:					
Lozinta-------------	80	Good		Poor	
		Thickest layer	0.62	Bottom layer	0.00
				Thickest layer	0.00
29:					
Manikan-------------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
30:					
Mellenthin----------	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Anasazi-------------	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
31:					
Mellenthin----------	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Barx----------------	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
32:					
Mellenthin----------	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 10a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Value	Potential source of sand: Rating class	Value
32:					
Progresso	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
33:					
Mellenthin	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
34:					
Mellenthin	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
35:					
Mellenthin	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
36:					
Mellenthin	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
37:					
Mido	95	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.22
38:					
Mido	90	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.06
		Thickest layer	0.00	Bottom layer	0.10
39:					
Milok	80	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.06
40:					
Moab	75	Fair		Poor	
		Thickest layer	0.38	Bottom layer	0.00
		Bottom layer	0.38	Thickest layer	0.00
41:					
Moab	50	Fair		Poor	
		Thickest layer	0.38	Bottom layer	0.00
		Bottom layer	0.38	Thickest layer	0.00
Mellenthin	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
42:					
Monue	85	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.03

Table 10a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
43:					
Padilla-------------	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Penistaja-----------	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.03
Campanile-----------	15	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
44:					
Palma---------------	85	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.03
45:					
Penistaja-----------	95	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.03
46:					
Pennell-------------	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Bacobi--------------	35	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.03
47:					
Pennell-------------	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
48:					
Poley---------------	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
49:					
Poley---------------	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Moab----------------	40	Fair		Poor	
		Thickest layer	0.38	Bottom layer	0.00
		Bottom layer	0.38	Thickest layer	0.00
50:					
Radnik--------------	95	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.03

Table 10a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Value	Potential source of sand: Rating class	Value
51:					
Riverwash-----------	100	Not rated		Not rated	
52:					
Royosa--------------	95	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.12
		Thickest layer	0.00	Thickest layer	0.22
53:					
Royosa--------------	65	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.12
		Thickest layer	0.00	Thickest layer	0.22
Tonalea-------------	25	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.22
54:					
Saido---------------	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Brinkerhoff---------	20	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.10
55:					
Sheppard------------	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.22
		Thickest layer	0.00	Thickest layer	0.50
56:					
Sheppard------------	90	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.10
		Thickest layer	0.00	Bottom layer	0.22
57:					
Showlow-------------	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Section-------------	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
58:					
Showlow-------------	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Thimble-------------	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 10a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
59:					
Showlow-------------	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
60:					
Showlow-------------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
61:					
Sponiker------------	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
62:					
Sponiker------------	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
63:					
Torriorthents-------	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Rock Outcrop--------	45	Not rated		Not rated	
64:					
Torriorthents-------	55	Not rated		Not rated	
Rock Outcrop--------	45	Not rated		Not rated	
65:					
Torriorthents-------	50	Not rated		Not rated	
Rock Outcrop--------	45	Not rated		Not rated	
Torriorthents-------	5	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
66:					
Whiskey-------------	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
67:					
Wukoki--------------	45	Good		Poor	
		Thickest layer	0.62	Bottom layer	0.00
				Thickest layer	0.00

Table 10a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Value	Potential source of sand: Rating class	Value
67:					
Lomaki	40	Good		Poor	
		Thickest layer	0.62	Bottom layer	0.00
				Thickest layer	0.00
68:					
Wutoma	70	Good		Poor	
		Thickest layer	0.62	Bottom layer	0.00
				Thickest layer	0.00
Lozinta	20	Good		Poor	
		Thickest layer	0.62	Bottom layer	0.00
				Thickest layer	0.00
69:					
Wutoma	60	Good		Poor	
		Thickest layer	0.62	Bottom layer	0.00
				Thickest layer	0.00
Lozinta	30	Good		Poor	
		Thickest layer	0.62	Bottom layer	0.00
				Thickest layer	0.00
70:					
Wutoma	60	Good		Poor	
		Thickest layer	0.00	Bottom layer	0.00
				Thickest layer	0.00
Rock Outcrop	30	Not rated		Not rated	
71:					
Yumtheska	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Goesling	25	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.03
72:					
Yumtheska	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
73:					
Yumtheska	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 10b.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
1:							
Badland	100	Not rated		Not rated		Not rated	
2:							
Barx	85	Fair		Fair		Fair	
		Low content of organic matter	0.88	Shrink-swell	0.87	Rock fragments	0.97
		Carbonate content	0.92				
3:							
Barx	80	Fair		Fair		Fair	
		Low content of organic matter	0.88	Shrink-swell	0.87	Rock fragments	0.97
		Carbonate content	0.92				
4:							
Begay	90	Good		Good		Good	
5:							
Begay	85	Good		Good		Good	
6:							
Bidonia	35	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Droughty	0.00	Shrink-swell	0.96	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.97
Bond	30	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Shrink-swell	0.87	Slope	0.04
		Low content of organic matter	0.50				
Rock Outcrop	15	Not rated		Not rated		Not rated	
7:							
Bond	65	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Shrink-swell	0.87		
		Low content of organic matter	0.50				
Bidonia	15	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Droughty	0.00	Shrink-swell	0.96	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.97

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
8:							
Brinkerhoff---------	65	Fair		Good		Poor	
		Droughty	0.12			Rock fragments	0.00
		Low content of organic matter	0.88				
		Carbonate content	0.92				
Grieta--------------	20	Fair		Good		Good	
		Low content of organic matter	0.12				
		Carbonate content	0.92				
9:							
Campanile-----------	80	Poor		Fair		Poor	
		Too clayey	0.00	Shrink-swell	0.12	Too clayey	0.00
10:							
Clayhole------------	95	Fair		Good		Fair	
		Low content of organic matter	0.88			Rock fragments	0.97
11:							
Curhollow-----------	45	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.21			Depth to bedrock	0.21
						Slope	0.37
Prieta--------------	35	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Droughty	0.00	Shrink-swell	0.87	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Low content of organic matter	0.50			Slope	0.37
12:							
Godding-------------	80	Poor		Poor		Poor	
		Too clayey	0.00	Cobble content	0.00	Too clayey	0.00
		Cobble content	0.36	Slope	0.18	Hard to reclaim	0.00
				Shrink-swell	0.74	Rock fragments	0.00
						Slope	0.00
13:							
Grieta--------------	80	Fair		Good		Good	
		Low content of organic matter	0.12				
		Carbonate content	0.92				
14:							
Grieta--------------	80	Fair		Good		Good	
		Low content of organic matter	0.12				
		Carbonate content	0.92				
15:							
Gypsids-------------	60	Fair		Poor		Poor	
		Low content of organic matter	0.88	Slope	0.00	Slope	0.00

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
15:							
Gypsids, Shallow	35	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Low content of organic matter	0.88	Slope	0.00	Slope	0.00
16:							
Hatknoll	50	Poor		Fair		Poor	
		Too clayey	0.00	Shrink-swell	0.99	Too clayey	0.00
		Low content of organic matter	0.88			Rock fragments	0.97
		Carbonate content	0.92				
		No water erosion limitation	0.99				
Kinan	35	Fair		Good		Poor	
		Low content of organic matter	0.12			Hard to reclaim	0.00
		Carbonate content	0.80			Carbonate content	0.80
17:							
Havasupai	65	Poor		Good		Poor	
		Droughty	0.00			Rock fragments	0.00
		Low content of organic matter	0.12				
		Carbonate content	0.32				
Mellenthin	15	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Carbonate content	0.68			Carbonate content	0.92
18:							
Jocity	80	Poor		Good		Poor	
		Wind erosion	0.00			Sodium content	0.00
		Sodium content	0.00				
		Low content of organic matter	0.88				
		No water erosion limitation	0.99				
19:							
Jocity	50	Fair		Fair		Good	
		Low content of organic matter	0.12	Shrink-swell	0.87		
		No water erosion limitation	0.99				
Clayhole	30	Fair		Good		Fair	
		Low content of organic matter	0.88			Rock fragments	0.97

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
20:							
Jocity	80	Fair Low content of organic matter Too clayey No water erosion limitation	 0.88 0.98 0.99	Good		Fair Too clayey	 0.70
21:							
Jocity	80	Fair Low content of organic matter Water erosion	 0.12 0.90	Fair Shrink-swell	 0.87	Good	
22:							
Kinan	80	Fair Low content of organic matter Carbonate content	 0.12 0.80	Good		Poor Hard to reclaim Carbonate content	 0.00 0.80
23:							
Kinan	50	Fair Low content of organic matter Carbonate content	 0.12 0.80	Good		Poor Hard to reclaim Carbonate content	 0.00 0.80
Hatknoll	25	Poor Too clayey Low content of organic matter Carbonate content No water erosion limitation	 0.00 0.88 0.92 0.99	Fair Shrink-swell	 0.99	Poor Too clayey Rock fragments	 0.00 0.97
Grieta	15	Fair Low content of organic matter Carbonate content	 0.12 0.92	Good		Good	
24:							
Kinan	55	Fair Low content of organic matter Carbonate content	 0.12 0.80	Good		Poor Hard to reclaim Carbonate content	 0.00 0.80
Pennell	35	Poor Droughty Depth to bedrock Low content of organic matter Carbonate content	 0.00 0.00 0.12 0.97	Poor Depth to bedrock	 0.00	Poor Depth to bedrock Slope	 0.00 0.63

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
25:							
Klondike	75	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.88
		Low content of organic matter	0.88			Slope	0.96
26:							
Lava Flows	100	Not rated		Not rated		Not rated	
27:							
Lozinta	85	Poor		Good		Good	
		Droughty	0.00				
		Low content of organic matter	0.12				
28:							
Lozinta	80	Poor		Poor		Poor	
		Droughty	0.00	Slope	0.00	Slope	0.00
		Low content of organic matter	0.12				
29:							
Manikan	80	Fair		Good		Good	
		Low content of organic matter	0.88				
		Water erosion	0.90				
30:							
Mellenthin	50	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.00
		Carbonate content	0.68				
Anasazi	40	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.58			Depth to bedrock	0.58
		Carbonate content	0.68				
31:							
Mellenthin	45	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.00
		Carbonate content	0.68				
Barx	35	Fair		Fair		Fair	
		Low content of organic matter	0.82	Shrink-swell	0.87	Rock fragments	0.97
		Carbonate content	0.92				

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
32:							
Mellenthin----------	50	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.00
		Carbonate content	0.68				
Progresso-----------	35	Fair		Poor		Fair	
		Depth to bedrock	0.58	Depth to bedrock	0.00	Depth to bedrock	0.58
		Droughty	0.64	Shrink-swell	0.96	Carbonate content	0.97
		Low content of organic matter	0.88				
		Carbonate content	0.97				
33:							
Mellenthin----------	75	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Carbonate content	0.68			Slope	0.16
34:							
Mellenthin----------	85	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Slope	0.00
		Depth to bedrock	0.00	Slope	0.00	Rock fragments	0.00
		Carbonate content	0.68			Depth to bedrock	0.00
35:							
Mellenthin----------	75	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Carbonate content	0.68			Slope	0.16
36:							
Mellenthin----------	80	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Carbonate content	0.68			Slope	0.16
37:							
Mido----------------	95	Poor		Good		Good	
		Wind erosion	0.00				
		Droughty	0.34				
		Low content of organic matter	0.88				
38:							
Mido----------------	90	Poor		Good		Good	
		Wind erosion	0.00				
		Droughty	0.37				
		Low content of organic matter	0.88				
39:							
Milok---------------	80	Fair		Good		Fair	
		Low content of organic matter	0.12			Carbonate content	0.46
		Carbonate content	0.46			Hard to reclaim	0.68
						Rock fragments	0.97

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
40:							
Moab	75	Poor		Good		Poor	
		Carbonate content	0.00			Carbonate content	0.00
		Droughty	0.11			Hard to reclaim	0.00
		Low content of organic matter	0.12			Rock fragments	0.00
41:							
Moab	50	Poor		Good		Poor	
		Carbonate content	0.00			Carbonate content	0.00
		Droughty	0.10			Hard to reclaim	0.00
		Low content of organic matter	0.12			Rock fragments	0.00
						Slope	0.63
Mellenthin	30	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
						Slope	0.63
42:							
Monue	85	Poor		Good		Good	
		Too alkaline	0.00				
		Low content of organic matter	0.50				
43:							
Padilla	50	Poor		Fair		Poor	
		Too clayey	0.00	Shrink-swell	0.12	Too clayey	0.00
		Low content of organic matter	0.82				
Penistaja	30	Fair		Fair		Good	
		Low content of organic matter	0.12				
Campanile	15	Poor		Fair		Poor	
		Too clayey	0.00	Shrink-swell	0.12	Too clayey	0.00
44:							
Palma	85	Poor		Good		Good	
		Wind erosion	0.00				
		Low content of organic matter	0.24				
45:							
Penistaja	95	Fair		Fair		Good	
		Low content of organic matter	0.12				
46:							
Pennell	50	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00				
		Low content of organic matter	0.12				
		Carbonate content	0.92				

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
46:							
Bacobi	35	Poor		Poor		Fair	
		Too alkaline	0.00	Depth to bedrock	0.00	Depth to bedrock	0.58
		Low content of organic matter	0.32			Sodium content	0.78
		Depth to bedrock	0.58			Carbonate content	0.92
		Droughty	0.60				
		Carbonate content	0.68				
		Sodium content	0.78				
47:							
Pennell	75	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00				
		Low content of organic matter	0.12				
		Carbonate content	0.92				
48:							
Poley	75	Fair		Fair		Poor	
		Low content of organic matter	0.18	Shrink-swell	0.96	Hard to reclaim	0.00
		Carbonate content	0.92			Carbonate content	0.92
		No water erosion limitation	0.99			Rock fragments	0.97
49:							
Poley	40	Fair		Fair		Poor	
		Low content of organic matter	0.18	Shrink-swell	0.96	Hard to reclaim	0.00
		Carbonate content	0.92			Carbonate content	0.92
		No water erosion limitation	0.99			Rock fragments	0.97
Moab	40	Poor		Good		Poor	
		Carbonate content	0.00			Carbonate content	0.00
		Droughty	0.10			Hard to reclaim	0.00
		Low content of organic matter	0.12			Rock fragments	0.00
50:							
Radnik	95	Good		Good		Fair	
						Rock fragments	0.97
51:							
Riverwash	100	Not rated		Not rated		Not rated	
52:							
Royosa	95	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.78
		Droughty	0.34				
		Too sandy	0.78				
		Low content of organic matter	0.88				

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
53:							
Royosa	65	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.78
		Droughty	0.34				
		Too sandy	0.78				
		Low content of organic matter	0.88				
Tonalea	25	Poor		Poor		Fair	
		Wind erosion	0.00	Depth to bedrock	0.00	Too sandy	0.22
		Droughty	0.00			Depth to bedrock	0.58
		Too sandy	0.22			Slope	0.96
		Depth to bedrock	0.58				
54:							
Saido	70	Fair		Good		Good	
		Low content of organic matter	0.32				
		Water erosion	0.90				
Brinkerhoff	20	Fair		Good		Poor	
		Droughty	0.16			Rock fragments	0.00
		Low content of organic matter	0.50				
		Carbonate content	0.92				
55:							
Sheppard	90	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.22
		Low content of organic matter	0.12				
		Too sandy	0.22				
		Droughty	0.34				
56:							
Sheppard	90	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.22
		Low content of organic matter	0.12				
		Too sandy	0.22				
		Droughty	0.35				
57:							
Showlow	45	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Carbonate content	0.97				
		No water erosion limitation	0.99				
Section	35	Fair		Good		Good	
		Carbonate content	0.92				
58:							
Showlow	50	Poor		Fair		Poor	
		Too clayey	0.00	Shrink-swell	0.49	Too clayey	0.00
						Hard to reclaim	0.50

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
58:							
Thimble	25	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Droughty	0.00	Shrink-swell	0.39	Rock fragments	0.00
		Depth to bedrock	0.00	Cobble content	0.45	Depth to bedrock	0.00
		Cobble content	0.37				
59:							
Showlow	75	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Too clayey	0.00
		Carbonate content	0.97				
		No water erosion limitation	0.99				
60:							
Showlow	80	Poor		Poor		Poor	
		Too clayey	0.00	Shrink-swell	0.00	Slope	0.00
		Carbonate content	0.97	Slope	0.00	Too clayey	0.00
		No water erosion limitation	0.99				
61:							
Sponiker	75	Poor		Fair		Poor	
		Too clayey	0.00	Shrink-swell	0.28	Too clayey	0.00
						Rock fragments	0.00
						Hard to reclaim	0.92
62:							
Sponiker	75	Poor		Poor		Poor	
		Too clayey	0.00	Slope	0.00	Too clayey	0.00
				Shrink-swell	0.28	Slope	0.00
						Rock fragments	0.00
						Hard to reclaim	0.92
63:							
Torriorthents	50	Poor		Poor		Poor	
		Low content of organic matter	0.00	Depth to bedrock	0.00	Slope	0.00
		Depth to bedrock	0.71	Slope	0.00	Depth to bedrock	0.71
Rock Outcrop	45	Not rated		Not rated		Not rated	
64:							
Torriorthents	55	Not rated		Not rated		Not rated	
Rock Outcrop	45	Not rated		Not rated		Not rated	
65:							
Torriorthents	50	Not rated		Not rated		Not rated	

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
65:							
Rock Outcrop--------	45	Not rated		Not rated		Not rated	
Torriorthents-------	5	Poor		Poor		Poor	
		Low content of organic matter	0.00	Slope	0.00	Slope	0.00
				Low strength	0.00		
66:							
Whiskey-------------	85	Good		Good		Fair	
						Rock fragments	0.97
67:							
Wukoki--------------	45	Poor		Poor		Poor	
		Droughty	0.00	Slope	0.00	Slope	0.00
		Low content of organic matter	0.12				
Lomaki--------------	40	Fair		Good		Poor	
		Droughty	0.03			Rock fragments	0.00
68:							
Wutoma--------------	70	Poor		Good		Good	
		Droughty	0.00				
		Low content of organic matter	0.12				
Lozinta-------------	20	Poor		Good		Good	
		Droughty	0.00				
		Low content of organic matter	0.12				
69:							
Wutoma--------------	60	Poor		Poor		Poor	
		Droughty	0.00	Slope	0.00	Slope	0.00
		Low content of organic matter	0.12				
Lozinta-------------	30	Poor		Poor		Poor	
		Droughty	0.00	Slope	0.00	Slope	0.00
		Low content of organic matter	0.12				
70:							
Wutoma--------------	60	Poor		Good		Good	
		Droughty	0.00				
		Low content of organic matter	0.12				
Rock Outcrop--------	30	Not rated		Not rated		Not rated	

Table 10b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
71:							
Yumtheska-----------	60	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Carbonate content	0.68			Carbonate content	0.68
Goesling------------	25	Fair		Good		Good	
		Low content of organic matter	0.88				
		Carbonate content	0.92				
72:							
Yumtheska-----------	75	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Carbonate content	0.68			Slope	0.37
						Carbonate content	0.68
73:							
Yumtheska-----------	75	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Slope	0.00
		Depth to bedrock	0.00	Slope	0.00	Rock fragments	0.00
		Carbonate content	0.68			Depth to bedrock	0.00
						Carbonate content	0.68

Table 11.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
1: Badland	---	---	---	---	---	---	---
2: Barx	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: erodes easily	Limitation: erodes easily too arid
3: Barx	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Favorable	Limitation: too arid
4: Begay	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily soil blowing	Limitation: erodes easily soil blowing	Limitation: erodes easily too arid
5: Begay	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope soil blowing	Limitation: erodes easily soil blowing	Limitation: erodes easily too arid
6: Bidonia	Severe: depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope	Limitation: depth to rock	Limitation: too arid depth to rock
Bond	Severe: slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing depth to rock	Limitation: slope soil blowing depth to rock	Limitation: slope too arid depth to rock
Rock Outcrop	---	---	---	---	---	---	---
7: Bond	Severe: depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing depth to rock	Limitation: soil blowing depth to rock	Limitation: too arid depth to rock
Bidonia	Severe: depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope soil blowing	Limitation: soil blowing depth to rock	Limitation: too arid depth to rock
8: Brinkerhoff	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: soil blowing droughty	Limitation: too sandy soil blowing	Limitation: too arid droughty
Grieta	Moderate: seepage slope	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: erodes easily soil blowing	Limitation: erodes easily too arid

Table 11.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
9:							
Campanile	Moderate: slope	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope slow intake	Limitation: percs slowly	Limitation: percs slowly too arid
10:							
Clayhole	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Favorable	Limitation: too arid
11:							
Curhollow	Severe: cemented pan slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: cemented pan slope depth to rock	Limitation: slope too arid droughty
Prieta	Severe: slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope droughty	Limitation: percs slowly slope depth to rock	Limitation: slope too arid droughty
12:							
Godding	Severe: slope	Severe: large stones	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones percs slowly slope	Limitation: large stones slope droughty
13:							
Grieta	Moderate: seepage slope	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: erodes easily soil blowing	Limitation: erodes easily too arid
14:							
Grieta	Moderate: seepage slope	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes easily	Limitation: erodes easily too arid
15:							
Gypsids	Severe: slope	Slight	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope too arid
Gypsids, Shallow	Severe: slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope too arid depth to rock
16:							
Hatknoll	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope	Limitation: erodes easily	Limitation: erodes easily too arid
Kinan	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Favorable	Limitation: too arid droughty
17:							
Havasupai	Severe: cemented pan seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: cemented pan large stones	Limitation: large stones too arid

Table 11.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
17:							
Mellenthin	Severe: depth to rock	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: depth to rock	Limitation: too arid droughty
18:							
Jocity	Slight	Severe: excess sodium piping	Severe: no water	Limitation: deep to water	Limitation: fast intake soil blowing droughty	Limitation: erodes easily soil blowing	Limitation: erodes easily excess sodium too arid
19:							
Jocity	Slight	Moderate: piping	Severe: no water	Limitation: deep to water	Favorable	Limitation: erodes easily	Limitation: erodes easily too arid
Clayhole	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Favorable	Limitation: too arid
20:							
Jocity	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly	Limitation: erodes easily	Limitation: erodes easily percs slowly too arid
21:							
Jocity	Slight	Moderate: piping	Severe: no water	Limitation: deep to water	Favorable	Limitation: erodes easily	Limitation: erodes easily too arid
22:							
Kinan	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope too arid droughty
23:							
Kinan	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Favorable	Limitation: too arid
Hatknoll	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope	Limitation: erodes easily	Limitation: erodes easily too arid
Grieta	Moderate: seepage slope	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes easily	Limitation: erodes easily too arid
24:							
Kinan	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Favorable	Limitation: too arid droughty
Pennell	Severe: slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: slope depth to rock	Limitation: slope too arid droughty

Table 11.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
25:							
Klondike	Severe: slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: erodes easily slope depth to rock	Limitation: erodes easily slope too arid
26:							
Lava Flows	---	---	---	---	---	---	---
27:							
Lozinta	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
28:							
Lozinta	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
29:							
Manikan	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Limitation: erodes easily	Limitation: erodes easily too arid
30:							
Mellenthin	Severe: slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope too arid
Anasazi	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily too arid
31:							
Mellenthin	Severe: slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope too arid
Barx	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Favorable	Limitation: too arid
32:							
Mellenthin	Severe: depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: large stones depth to rock	Limitation: large stones too arid
Progresso	Moderate: seepage slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing depth to rock	Limitation: soil blowing depth to rock	Limitation: too arid depth to rock
33:							
Mellenthin	Severe: slope depth to rock	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: slope depth to rock	Limitation: slope too arid droughty

Table 11.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
34: Mellenthin	Severe: slope, depth to rock	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope, depth to rock, droughty	Limitation: slope, depth to rock	Limitation: slope, too arid, droughty
35: Mellenthin	Severe: slope, depth to rock	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope, depth to rock, droughty	Limitation: slope, depth to rock	Limitation: slope, too arid, droughty
36: Mellenthin	Severe: slope, depth to rock	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope, depth to rock, droughty	Limitation: slope, depth to rock	Limitation: slope, too arid, droughty
37: Mido	Severe: seepage	Severe: seepage, piping	Severe: no water	Limitation: deep to water	Limitation: fast intake, slope, droughty	Limitation: too sandy	Limitation: too arid
38: Mido	Severe: seepage	Severe: seepage, piping	Severe: no water	Limitation: deep to water	Limitation: fast intake, droughty	Limitation: erodes easily, too sandy	Limitation: erodes easily, too arid
39: Milok	Severe: seepage, slope	Moderate: seepage, piping	Severe: no water	Limitation: deep to water	Limitation: slope, droughty	Limitation: slope	Limitation: slope, too arid, droughty
40: Moab	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope, droughty	Favorable	Limitation: too arid, droughty
41: Moab	Severe: seepage, slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: large stones, slope, droughty	Limitation: large stones, slope	Limitation: large stones, slope, too arid
Mellenthin	Severe: slope, depth to rock	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope, depth to rock, droughty	Limitation: slope, depth to rock	Limitation: slope, too arid, droughty
42: Monue	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope, soil blowing	Limitation: soil blowing	Limitation: too arid
43: Padilla	Slight	Moderate: hard to pack	Severe: no water	Limitation: deep to water	Limitation: percs slowly, slow intake	Limitation: percs slowly	Limitation: percs slowly, too arid

Table 11.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
43:							
Penistaja	Severe: seepage	Slight	Severe: no water	Limitation: deep to water	Limitation: soil blowing	Limitation: soil blowing	Limitation: too arid
Campanile	Moderate: slope	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope slow intake	Limitation: percs slowly	Limitation: percs slowly too arid
44:							
Palma	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: soil blowing	Limitation: too arid droughty
45:							
Penistaja	Severe: seepage	Slight	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Limitation: too arid
46:							
Pennell	Severe: depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: depth to rock	Limitation: too arid droughty
Bacobi	Severe: seepage	Severe: excess sodium piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing depth to rock	Limitation: soil blowing depth to rock	Limitation: excess sodium too arid depth to rock
47:							
Pennell	Severe: depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: depth to rock	Limitation: too arid droughty
48:							
Poley	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope	Limitation: erodes easily	Limitation: erodes easily percs slowly too arid
49:							
Poley	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope	Limitation: erodes easily	Limitation: erodes easily percs slowly too arid
Moab	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones	Limitation: large stones too arid
50:							
Radnik	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Limitation: too arid

Table 11.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
51: Riverwash	---	---	---	---	---	---	---
52: Royosa	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
53: Royosa	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
Tonalea	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy depth to rock	Limitation: slope depth to rock droughty
54: Saido	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily excess salt slope	Limitation: erodes easily	Limitation: excess salt too arid
Brinkerhoff	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: too sandy	Limitation: too arid droughty
55: Sheppard	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: too arid droughty
56: Sheppard	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake droughty	Limitation: too sandy soil blowing	Limitation: too arid droughty
57: Showlow	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope too arid
Section	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes easily slope	Limitation: erodes easily slope too arid
58: Showlow	Severe: slope	Moderate: hard to pack piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope	Limitation: erodes easily slope too arid

Table 11.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
58:							
Thimble	Severe: slope depth to rock	Severe: large stones	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
59:							
Showlow	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope too arid
60:							
Showlow	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope too arid
61:							
Sponiker	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope	Limitation: large stones percs slowly slope	Limitation: large stones percs slowly slope
62:							
Sponiker	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope	Limitation: large stones percs slowly slope	Limitation: large stones percs slowly slope
63:							
Torriorthents	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope too arid depth to rock
Rock Outcrop	---	---	---	---	---	---	---
64:							
Torriorthents	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope too arid depth to rock
Rock Outcrop	---	---	---	---	---	---	---
65:							
Torriorthents	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope too arid depth to rock
Rock Outcrop	---	---	---	---	---	---	---
Torriorthents	---	---	---	---	---	---	---
66:							
Whiskey	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: soil blowing	Limitation: soil blowing	Favorable

Table 11.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
67:							
Wukoki	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope too arid droughty
Lomaki	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Favorable	Limitation: too arid droughty
68:							
Wutoma	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
Lozinta	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
69:							
Wutoma	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
Lozinta	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
70:							
Wutoma	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
Rock Outcrop	---	---	---	---	---	---	---
71:							
Yumtheska	Severe: slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: slope depth to rock	Limitation: slope depth to rock droughty
Goesling	Moderate: slope	Slight	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: erodes easily	Limitation: erodes easily too arid
72:							
Yumtheska	Severe: slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: slope depth to rock	Limitation: slope depth to rock droughty
73:							
Yumtheska	Severe: slope depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: slope depth to rock	Limitation: slope depth to rock droughty

Table 12.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
1: Badland	---	---	---	---	---	---	---	---	---	---	---	---
2: Barx	0-5	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-4	0	0	100	100	70-90	40-60	20-30	NP-10
	5-8	Sandy clay loam, clay loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	70-100	50-75	20-35	5-15
	8-28	Sandy clay loam, loam, clay loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0-10	80-100	75-100	60-100	35-75	20-40	5-20
	28-60	Sandy loam, sandy clay loam, loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0-10	80-100	75-100	45-95	30-70	20-35	5-15
3: Barx	0-2	Loam	CL-ML, ML	A-4	0	0	80-100	75-100	65-95	50-75	20-30	NP-10
	2-8	Fine sandy loam, sandy clay loam, loam	CL-ML, CL	A-4, A-6	0	0	100	100	70-100	50-75	20-35	5-15
	8-28	Sandy clay loam, loam, clay loam	CL, CL-ML	A-4, A-6	0	0-10	80-100	75-100	60-100	35-75	20-40	5-20
	28-60	Sandy loam, sandy clay loam, loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0-10	80-100	75-100	45-95	30-70	20-35	5-15
4: Begay	0-3	Fine sandy loam	SM	A-4	0	0-5	95-100	90-100	70-85	40-50	20-25	NP-5
	3-35	Fine sandy loam	SM	A-4	0	0	95-100	90-100	70-85	40-50	20-25	NP-5
	35-55	Loamy fine sand	SM	A-2	0	0	95-100	90-100	65-80	25-35	0-15	NP
	55-60	Fine sandy loam	SM	A-4	0	0	95-100	90-100	70-85	40-50	20-25	NP-5
5: Begay	0-3	Fine sandy loam	SM	A-4	0	0-5	95-100	90-100	70-85	40-50	20-25	NP-5
	3-35	Fine sandy loam	SM	A-4	0	0	95-100	90-100	70-85	40-50	20-25	NP-5
	35-55	Loamy fine sand	SM	A-2	0	0	95-100	90-100	65-80	25-35	0-15	NP
	55-60	Fine sandy loam	SM	A-4	0	0	95-100	90-100	70-85	40-50	20-25	NP-5
6: Bidonia	0-1	Very channery loam	GM, GC-GM	A-1, A-2, A-4	0	5-20	30-50	25-45	20-45	15-40	20-30	NP-10
	1-3	Channery fine sandy loam, loam	CL-ML, ML	A-4	0	0	55-100	50-100	50-95	50-75	10-30	NP-10
	3-10	Clay, sandy clay	CH, CL	A-7	0	0	80-100	75-100	75-100	55-95	40-65	20-45
	10-14	Channery clay loam	CL, GC, SC	A-6	0	0	55-80	50-75	45-75	35-60	30-35	10-15
	14-24	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
6:												
Bond	0-5	Gravelly sandy loam	SC-SM, SM	A-4	0	0	60-80	55-75	35-50	20-35	20-25	NP-10
	5-17	Sandy clay loam	SC, SC-SM	A-2, A-4, A-6	0	0	90-100	85-100	70-90	30-50	25-35	5-15
	17-19	Sandy clay loam	SC, SC-SM	A-2, A-4, A-6	0	0	90-100	85-100	70-90	30-50	25-35	5-15
	19-29	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock Outcrop	---	---	---	---	---	---	---	---	---	---	---	---
7:												
Bond	0-5	Fine sandy loam	SM	A-4	0	0	90-100	85-100	60-85	35-50	20-30	NP-10
	5-17	Sandy clay loam	SC, SC-SM	A-2, A-4, A-6	0	0	90-100	85-100	70-90	30-50	25-35	5-15
	17-19	Sandy clay loam	SC, SC-SM	A-2, A-4, A-6	0	0	90-100	85-100	70-90	30-50	25-35	5-15
	19-29	Unweathered bedrock			---	---	---	---	---	---	---	---
Bidonia	0-1	Sandy loam	SC-SM, SM	A-2, A-4	0	0	85-100	80-100	50-70	25-40	20-30	NP-10
	1-3	Channery fine sandy loam, loam	CL, CL-ML, ML	A-4	0	0	55-100	50-100	50-95	50-75	10-30	NP-10
	3-10	Clay, sandy clay	CH, CL	A-7	0	0	80-100	75-100	75-100	55-95	40-65	20-45
	10-14	Channery clay loam	CL, GC, SC	A-6	0	0	55-80	50-75	45-75	35-60	30-35	10-15
	14-24	Unweathered bedrock			---	---	---	---	---	---	---	---
8:												
Brinkerhoff	0-4	Sandy loam	SC-SM, SM	A-4, A-2	0	0	85-100	80-100	50-70	25-40	20-30	NP-10
	4-17	Sandy loam, gravelly sandy loam	SC-SM, SM	A-1, A-2	0	0	55-95	50-90	30-70	15-35	20-25	NP-10
	17-28	Loamy sand, gravelly loamy sand	SM	A-1, A-2	0	0	55-95	50-90	25-75	10-30	15-25	NP-5
	28-60	Gravelly coarse sand	SP, SP-SM	A-1	0	0	55-100	50-100	25-50	5-10	0-15	NP-5
Grieta	0-3	Fine sandy loam	SC-SM	A-4	0	0	100	85-100	80-95	35-50	20-25	5-10
	3-25	Loam	CL-ML	A-4	0	0	90-100	85-100	70-95	50-75	20-30	5-10
	25-60	Loam	CL-ML	A-4	0	0	90-100	85-100	70-95	50-75	20-30	5-10
9:												
Campanile	0-60	Clay	CH, CL	A-7	0	0	95-100	90-100	80-100	70-95	40-65	20-45
10:												
Clayhole	0-2	Loam	CL-ML, ML	A-4	0	0	80-100	75-100	65-95	50-75	20-30	NP-10
	2-60	Loam, silt loam	CL-ML	A-4	0	0	80-100	75-100	65-95	50-75	20-30	5-10
11:												
Curhollow	0-2	Gravelly loam	SM, SC-SM	A-2, A-4	0	0-5	55-80	50-75	40-70	30-50	20-30	NP-10
	2-12	Very gravelly loam	GC-GM	A-1, A-2, A-4	0	0-5	30-50	25-45	20-45	15-40	20-30	5-10
	12-22	Cemented			---	---	---	---	---	---	---	---
	22-32	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
11:												
Prieta----------	0-2	Very gravelly loam	GM, GC-GM	A-4, A-1, A-2	0	0-10	30-50	25-45	20-45	15-40	20-30	NP-10
	2-6	Very gravelly silty clay loam	GC	A-2, A-6	0	0-10	30-50	25-50	25-50	20-50	30-40	5-15
	6-16	Very gravelly silty clay	GC	A-2, A-7	0	0-10	30-50	25-50	25-50	20-50	40-65	15-45
	16-26	Unweathered bedrock			---	---	---	---	---	---	---	---
12:												
Godding---------	0-5	Gravelly loam	SM, SC-SM	A-2, A-4	0	0-5	55-80	50-75	40-70	30-50	20-30	NP-10
	5-12	Gravelly clay loam	CL, SC	A-6	0	0-10	55-80	50-75	45-75	35-60	30-35	10-15
	12-41	Very cobbly clay	CH, CL, SC	A-7	0-10	35-60	55-80	50-75	45-75	40-70	40-55	20-40
	41-60	Very cobbly clay loam	CL, SC	A-6	0-10	35-60	55-80	50-75	45-75	35-60	30-35	10-15
13:												
Grieta----------	0-3	Fine sandy loam	SC-SM	A-4	0	0	100	85-100	80-95	35-50	20-25	5-10
	3-25	Loam	CL-ML	A-4	0	0	90-100	85-100	70-95	50-75	20-30	5-10
	25-60	Loam	CL-ML	A-4	0	0	90-100	85-100	70-95	50-75	20-30	5-10
14:												
Grieta----------	0-3	Loam	CL-ML	A-4	0	0	90-100	85-100	70-95	50-75	20-30	5-10
	3-25	Loam	CL-ML	A-4	0	0	90-100	85-100	70-95	50-75	20-30	5-10
	25-60	Loam	CL-ML	A-4	0	0	90-100	85-100	70-95	50-75	20-30	5-10
15:												
Gypsids---------	0-2	Variable			---	---	---	---	---	---	---	---
	2-13	Variable			---	---	---	---	---	---	---	---
	13-31	Variable			---	---	---	---	---	---	---	---
	31-60	Variable			---	---	---	---	---	---	---	---
Gypsids, Shallow	0-1	Variable			---	---	---	---	---	---	---	---
	1-7	Variable			---	---	---	---	---	---	---	---
	7-20	Weathered bedrock			---	---	---	---	---	---	---	---
16:												
Hatknoll--------	0-3	Silty clay loam	CL, ML	A-6	0	0	100	90-100	85-100	75-95	30-40	10-15
	3-20	Silty clay	CH, CL	A-7	0	0	80-100	75-100	75-100	55-95	40-65	15-45
	20-25	Gravelly silty clay	CH, CL	A-7	0	0	60-80	55-75	55-75	50-70	40-65	15-45
	25-60	Loam	CL-ML, ML	A-4	0	0	95-100	90-100	75-95	55-75	15-35	NP-10
Kinan-----------	0-7	Gravelly loam	SC-SM	A-4, A-2	0	0-5	70-85	60-75	50-65	30-50	15-25	5-10
	7-14	Gravelly loam	SC-SM	A-4, A-2	0	0-5	70-85	60-75	50-65	30-50	15-25	5-10
	14-44	Loam	CL-ML	A-4	0	0	95-100	85-95	60-85	50-70	20-30	5-10
	44-60	Channery loam, very channery sandy clay loam	GC, GC-GM, SC-SM, SC	A-1, A-2	0	0-10	40-60	30-50	20-40	10-30	20-30	5-15

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
17:												
Havasupai-------	0-2	Very gravelly loam	GC-GM	A-1, A-2, A-4	0	0-10	35-50	30-45	25-45	15-40	25-35	5-10
	2-9	Gravelly loam, very gravelly fine sandy loam	GC-GM	A-1, A-2, A-4	0	0-25	40-50	35-45	25-45	15-40	25-35	5-10
	9-17	Extremely gravelly loam, very cobbly loam, very gravelly sandy clay loam	GC, GC-GM, GP-GC	A-1, A-2	0	10-55	15-40	10-35	5-30	5-25	25-40	5-15
	17-35	Indurated			---	---	---	---	---	---	0-14	---
	35-60	Extremely gravelly sand, extremely gravelly sandy loam, extremely gravelly coarse sand	GP	A-1	0	0-10	10-30	5-25	2-20	0-10	15-25	NP-5
Mellenthin------	0-8	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	30-50	25-45	20-45	15-40	20-30	NP-10
	8-15	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	35-50	25-45	20-45	15-40	20-30	NP-10
	15-25	Unweathered bedrock			---	---	---	---	---	---	---	---
18:												
Jocity----------	0-4	Loamy fine sand	SM	A-2	0	0	100	100	65-80	20-35	0-15	NP-5
	4-60	Silt loam, loam	CL-ML, ML	A-4	0	0	90-100	85-100	70-100	50-90	25-35	5-10
19:												
Jocity----------	0-4	Silty clay loam	CL, ML	A-6	0	0	100	100	95-100	85-95	30-40	10-15
	4-60	Loam, silt loam	CL-ML, ML	A-4	0	0	90-100	85-100	70-100	50-90	25-35	5-10
Clayhole--------	0-2	Silty clay loam	CL	A-6	0	0	80-100	75-100	70-100	65-80	30-35	10-15
	2-60	Loam, silt loam	CL-ML	A-4	0	0	80-100	75-100	65-95	55-80	20-30	5-10
20:												
Jocity----------	0-4	Silty clay loam	CL, ML	A-6	0	0	100	100	95-100	85-95	30-40	10-20
	4-11	Clay	CH, CL	A-7	0	0	100	100	90-100	75-95	40-55	20-45
	11-15	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	70-85	40-50	20-25	NP-10
	15-33	Clay loam	CL	A-6	0	0	100	100	90-100	70-80	30-35	10-15
	33-60	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	70-85	40-50	20-25	NP-10
21:												
Jocity----------	0-4	Silty clay loam	CL, ML	A-6	0	0	100	100	95-100	85-95	30-40	10-15
	4-60	Loam, silt loam	CL-ML, ML	A-4	0	0	90-100	85-100	70-100	50-90	25-35	5-10
22:												
Kinan-----------	0-7	Gravelly loam	SC-SM	A-4, A-2	0	0-5	70-85	60-75	50-65	30-50	15-25	5-10
	7-14	Gravelly loam	SC-SM	A-4, A-2	0	0-5	70-85	60-75	50-65	30-50	15-25	5-10
	14-44	Loam	CL-ML	A-4	0	0	95-100	85-95	60-85	50-70	20-30	5-10
	44-60	Channery loam, very channery sandy clay loam	GC, GC-GM, SC-SM, SC	A-1, A-2	0	0-10	40-60	30-50	20-40	10-30	20-30	5-15

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
23:												
Kinan-----------	0-7	Loam	CL-ML	A-4	0	0	95-100	85-95	60-85	50-70	20-30	5-10
	7-14	Gravelly loam	SC-SM	A-4, A-2	0	0-5	70-85	60-75	50-65	30-50	15-25	5-10
	14-44	Loam	CL-ML	A-4	0	0	95-100	85-95	60-85	50-70	20-30	5-10
	44-60	Channery loam, very channery sandy clay loam	GC, GC-GM, SC-SM, SC	A-1, A-2	0	0-10	40-60	30-50	20-40	10-30	20-30	5-15
Hatknoll--------	0-3	Silty clay loam	CL, ML	A-6	0	0	100	90-100	85-100	75-95	30-40	10-15
	3-20	Silty clay	CH, CL	A-7	0	0	80-100	75-100	75-100	55-95	40-65	15-45
	20-25	Gravelly silty clay	CH, CL	A-7	0	0	60-80	55-75	55-75	50-70	40-65	15-45
	25-60	Loam	CL-ML, ML	A-4	0	0	95-100	90-100	75-95	55-75	15-35	NP-10
Grieta----------	0-3	Loam	CL-ML	A-4	0	0	90-100	85-100	70-95	50-75	20-30	5-10
	3-25	Loam	CL-ML	A-4	0	0	90-100	85-100	70-95	50-75	20-30	5-10
	25-60	Loam	CL-ML	A-4	0	0	90-100	85-100	70-95	50-75	20-30	5-10
24:												
Kinan-----------	0-7	Gravelly loam	SC-SM	A-4, A-2	0	0-5	70-85	60-75	50-65	30-50	15-25	5-10
	7-14	Gravelly loam	SC-SM	A-4, A-2	0	0-5	70-85	60-75	50-65	30-50	15-25	5-10
	14-44	Loam	CL-ML	A-4	0	0	95-100	85-95	60-85	50-70	20-30	5-10
	44-60	Channery loam, very channery sandy clay loam	GC, GC-GM, SC-SM, SC	A-1, A-2	0	0-10	40-60	30-50	20-40	10-30	20-30	5-15
Pennell---------	0-2	Gravelly loam	SC-SM, SM	A-4	0	0	75-80	70-75	60-70	40-50	20-25	NP-10
	2-9	Sandy loam	SC-SM, SM	A-2, A-4	0	0	90-100	85-100	50-70	25-40	20-25	NP-10
	9-12	Gravelly sandy loam	SM, SC-SM	A-1, A-2	0	0-10	65-80	60-75	35-50	15-30	20-25	NP-10
	12-22	Unweathered bedrock			---	---	---	---	---	---	---	---
25:												
Klondike--------	0-2	Sandy clay loam	SC, SC-SM	A-2, A-4, A-6	0	0-5	80-100	75-100	60-90	25-50	25-35	5-15
	2-11	Loam, gravelly loam, clay loam	CL-ML, SC-SM	A-2, A-4	0	0-5	75-100	70-100	50-85	30-75	20-30	5-10
	11-21	Weathered bedrock			---	---	---	---	---	---	---	---
26:												
Lava Flows------	---	---	---	---	---	---	---	---	---	---	---	---
27:												
Lozinta---------	0-10	Extremely gravelly loam	GC, GC-GM	A-1, A-2	0	0	20-30	15-25	15-25	10-20	20-30	NP-10
	10-24	Extremely gravelly loam	GC, GC-GM	A-1, A-2	0	0	20-30	15-25	15-25	10-20	20-30	NP-10
	24-60	Cinders	GP	A-1	0	0	5-10	0-5	0-5	0-5	0-14	NP
28:												
Lozinta---------	0-10	Extremely gravelly loam	GC, GC-GM	A-1, A-2	0	0	20-30	15-25	15-25	10-20	20-30	NP-10
	10-24	Extremely gravelly loam	GC, GC-GM	A-1, A-2	0	0	20-30	15-25	15-25	10-20	20-30	NP-10
	24-60	Cinders	GP	A-1	0	0	5-10	0-5	0-5	0-5	0-14	NP

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
29:												
Manikan---------	0-4	Silty clay loam	CL, ML	A-6, A-7	0	0	95-100	90-100	80-100	75-90	35-45	10-20
	4-60	Silt loam, loam	CL-ML	A-4	0	0	95-100	90-100	80-100	65-80	25-30	5-10
30:												
Mellenthin------	0-8	Gravelly fine sandy loam	SM	A-2, A-4	0	0-15	70-85	60-75	50-65	30-45	20-25	NP-5
	8-15	Very gravelly loam	GM	A-2	0	10-15	35-50	30-45	25-45	20-35	20-25	NP-5
	15-25	Unweathered bedrock			---	---	---	---	---	---	---	---
Anasazi---------	0-12	Gravelly loam	SC-SM	A-1, A-2, A-4	0	0-15	55-80	50-75	30-65	20-45	15-25	5-10
	12-23	Gravelly loam, gravelly fine sandy loam	SC-SM, SM	A-1, A-2, A-4	0	0-10	55-80	50-75	35-65	20-45	15-20	NP-10
	23-33	Unweathered bedrock			---	---	---	---	---	---	---	---
31:												
Mellenthin------	0-8	Gravelly loam	SM, SC-SM	A-2, A-4	0	0-5	55-80	50-75	40-70	30-50	20-30	NP-10
	8-15	Very gravelly loam	GM	A-2	0	10-15	35-50	30-45	25-45	20-35	20-25	NP-5
	15-25	Unweathered bedrock			---	---	---	---	---	---	---	---
Barx------------	0-2	Gravelly loam	SM, SC-SM	A-2, A-4	0	0	55-80	50-75	40-70	30-50	20-30	NP-10
	2-8	Fine sandy loam, sandy clay loam, loam	CL-ML, CL	A-6, A-4	0	0	100	100	70-100	50-75	20-35	5-15
	8-28	Sandy clay loam, loam, clay loam	CL, CL-ML	A-4, A-6	0	0-10	80-100	75-100	60-100	35-75	20-40	5-20
	28-60	Sandy loam, sandy clay loam, loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0-10	80-100	75-100	45-95	30-70	20-35	5-15
32:												
Mellenthin------	0-8	Gravelly loam	SM, SC-SM	A-2, A-4	0	0-5	55-80	50-75	40-70	30-50	20-30	NP-10
	8-15	Very gravelly loam	GM	A-2	0	10-15	35-50	30-45	25-45	20-35	20-25	NP-5
	15-25	Unweathered bedrock			---	---	---	---	---	---	---	---
Progresso-------	0-4	Sandy loam	SC-SM	A-1, A-2, A-4	0	0	80-100	75-100	45-85	20-50	20-30	5-10
	4-27	Sandy clay loam	CL, SC	A-6	0	0	100	95-100	80-90	40-60	25-35	10-15
	27-37	Unweathered bedrock			---	---	---	---	---	---	---	---
33:												
Mellenthin------	0-8	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	30-50	25-45	20-45	15-40	20-30	NP-10
	8-15	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	35-50	25-45	20-45	15-40	20-30	NP-10
	15-25	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
34:												
Mellenthin------	0-8	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	30-50	25-45	20-45	15-40	20-30	NP-10
	8-15	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	35-50	25-45	20-45	15-40	20-30	NP-10
	15-25	Unweathered bedrock			---	---	---	---	---	---	---	---
35:												
Mellenthin------	0-8	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	30-50	25-45	20-45	15-40	20-30	NP-10
	8-15	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	35-50	25-45	20-45	15-40	20-30	NP-10
	15-25	Unweathered bedrock			---	---	---	---	---	---	---	---
36:												
Mellenthin------	0-8	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	30-50	25-45	20-45	15-40	20-30	NP-10
	8-15	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	35-50	25-45	20-45	15-40	20-30	NP-10
	15-25	Unweathered bedrock			---	---	---	---	---	---	---	---
37:												
Mido------------	0-2	Fine sand	SM	A-2	0	0	100	100	65-80	15-25	0-15	NP
	2-60	Loamy fine sand, fine sand, loamy sand	SM	A-2, A-4	0	0	100	100	70-90	20-45	0-15	NP
38:												
Mido------------	0-2	Loamy fine sand	SM	A-2, A-4	0	0	100	100	75-95	30-50	20-25	NP-5
	2-60	Loamy fine sand, fine sand, loamy sand	SM	A-2, A-4	0	0	100	100	70-90	20-45	0-15	NP
39:												
Milok-----------	0-3	Gravelly loam	ML, CL-ML, SM, SC-SM	A-2, A-4	0	0	60-80	55-75	40-70	30-60	20-30	5-10
	3-11	Loam	ML, CL-ML	A-4	0	0	85-100	80-95	65-85	50-70	20-25	5-10
	11-30	Sandy loam	SC-SM, SM	A-2	0	0-5	85-100	80-95	45-65	30-35	15-25	NP-10
	30-60	Gravelly sandy loam	SC-SM, SM	A-2	0	0-5	60-80	55-75	35-50	20-30	15-25	NP-10
40:												
Moab------------	0-2	Loam	CL-ML, ML	A-4	0	0-10	90-100	80-95	70-90	50-70	15-25	NP-10
	2-11	Very gravelly loam	GC-GM, GM	A-2, A-1	0	0-10	35-50	25-45	20-40	15-35	15-25	NP-10
	11-38	Extremely gravelly loam, very gravelly loam	GC-GM, GM, GP-GM	A-1, A-2	0	0-15	20-50	15-45	15-40	5-30	15-25	NP-10
	38-60	Extremely gravelly sandy loam, very gravelly loam	GM, GP-GM	A-1	0	0-15	20-45	15-40	10-35	5-25	15-20	NP-5

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
41:												
Moab	0-2	Gravelly loam	CL, CL-ML, SC, SC-SM	A-2, A-4	0	0-10	55-80	50-75	40-70	30-55	20-30	5-10
	2-11	Very gravelly loam	GC-GM, GM	A-2, A-1	0	0-10	35-50	25-45	20-40	15-35	15-25	NP-10
	11-38	Extremely gravelly loam, very gravelly loam	GC-GM, GM, GP-GM	A-1, A-2	0	0-15	20-50	15-45	15-40	5-30	15-25	NP-10
	38-60	Extremely gravelly sandy loam, very gravelly loam	GM, GP-GM	A-1	0	0-15	20-45	15-40	10-35	5-25	15-20	NP-5
Mellenthin	0-8	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	30-50	25-45	20-45	15-40	20-30	NP-10
	8-15	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0-5	0-5	35-50	25-45	20-45	15-40	20-30	NP-10
	15-25	Unweathered bedrock			---	---	---	---	---	---	---	---
42:												
Monue	0-5	Fine sandy loam	SC-SM, SM	A-4	0	0	100	95-100	70-85	40-50	15-25	NP-10
	5-40	Fine sandy loam	SC-SM, SM	A-4	0	0	100	95-100	70-85	40-50	15-25	NP-10
	40-46	Silty clay loam	CL, ML	A-6	0	0	100	95-100	90-100	80-95	30-40	10-15
	46-60	Loam, fine sandy loam	ML, CL-ML, SC, SC-SM	A-4	0	0	100	95-100	70-95	40-75	20-30	5-10
43:												
Padilla	0-2	Clay	CL	A-7	0	0	100	100	90-100	75-95	40-50	15-30
	2-60	Clay, clay loam	CL	A-7	0	0	90-100	85-100	75-100	55-90	40-50	15-30
Penistaja	0-5	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0	90-100	85-100	80-95	30-50	20-25	NP-10
	5-19	Sandy clay loam	SC-SM, SC	A-6	0	0	95-100	90-100	80-90	35-50	25-35	5-15
	19-42	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0	90-100	85-100	80-95	30-50	20-25	NP-10
	42-60	Silty clay loam	CL, ML	A-6	0	0	100	95-100	90-100	80-95	30-40	10-15
Campanile	0-60	Clay	CH, CL	A-7	0	0	95-100	90-100	80-100	70-95	40-65	20-45
44:												
Palma	0-8	Loamy fine sand	SM	A-2, A-4	0	0	100	100	65-80	30-45	15-20	NP-5
	8-33	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	70-85	40-50	20-25	NP-10
	33-60	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	70-85	40-50	20-25	NP-10
45:												
Penistaja	0-5	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0	90-100	85-100	80-95	30-50	20-25	NP-10
	5-19	Sandy clay loam	SC-SM, SC	A-6	0	0	95-100	90-100	80-90	35-50	25-35	5-15
	19-42	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0	90-100	85-100	80-95	30-50	20-25	NP-10
	42-60	Silty clay loam	CL, ML	A-6	0	0	100	95-100	90-100	80-95	30-40	10-15
46:												
Pennell	0-2	Gravelly sandy loam	SC-SM, SM	A-1, A-2	0	0	70-80	65-75	40-50	20-30	20-25	NP-10
	2-9	Sandy loam	SC-SM, SM	A-2, A-4	0	0	90-100	85-100	50-70	25-40	20-25	NP-10
	9-12	Gravelly sandy loam	SM, SC-SM	A-1, A-2	0	0-10	65-80	60-75	35-50	15-30	20-25	NP-10
	12-22	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
46:												
Bacobi----------	0-2	Sandy loam	SC-SM, SM	A-2, A-4	0	0	90-100	85-100	50-70	25-40	15-25	NP-10
	2-13	Sandy clay loam	SC-SM	A-2, A-4	0	0	90-100	85-100	70-90	30-50	25-30	5-10
	13-28	Sandy clay loam	SC-SM	A-2, A-4	0	0	90-100	85-100	70-90	30-50	25-30	5-10
	28-32	Sandy loam	SM, SC-SM	A-2, A-4	0	0	90-100	85-100	50-70	25-40	20-25	NP-10
	32-42	Weathered bedrock			---	---	---	---	---	---	---	---
47:												
Pennell---------	0-2	Gravelly loam	SM, SC-SM	A-4	0	0	75-80	70-75	60-70	40-50	20-25	NP-10
	2-9	Sandy loam	SM, SC-SM	A-2, A-4	0	0	90-100	85-100	50-70	25-40	20-25	NP-10
	9-12	Gravelly sandy loam	SM, SC-SM	A-1, A-2	0	0-10	65-80	60-75	35-50	15-30	20-25	NP-10
	12-22	Unweathered bedrock			---	---	---	---	---	---	---	---
48:												
Poley-----------	0-2	Cobbly silty clay loam	ML, CL	A-6	0-5	15-45	80-95	75-90	70-90	65-80	30-40	10-15
	2-18	Silty clay, silty clay loam	CH, CL	A-6, A-7	0	0-5	85-100	75-100	70-100	70-95	30-60	10-30
	18-36	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0-5	85-100	75-100	70-100	50-95	25-40	5-15
	36-49	Gravelly clay loam, clay loam	CL, SC	A-6	0	0-10	55-85	50-80	45-75	35-60	30-40	10-15
	49-60	Extremely cobbly loam	SM, SC-SM	A-2, A-4	0-5	50-85	55-80	45-70	40-60	25-45	20-30	NP-10
49:												
Poley-----------	0-2	Very cobbly silt loam	ML, CL-ML, SM, SC-SM	A-4	0-5	30-50	55-80	50-75	45-75	35-65	20-30	NP-10
	2-18	Silty clay, silty clay loam	CH, CL	A-6, A-7	0	0-5	85-100	75-100	70-100	70-95	30-60	10-30
	18-36	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0-5	85-100	75-100	70-100	50-95	25-40	5-15
	36-49	Gravelly clay loam, clay loam	CL, SC	A-6	0	0-10	55-85	50-80	45-75	35-60	30-40	10-15
	49-60	Extremely cobbly loam	SM, SC-SM	A-2, A-4	0-5	50-85	55-80	45-70	40-60	25-45	20-30	NP-10
Moab------------	0-2	Gravelly loam	SM, SC-SM	A-2	0	0-10	55-80	50-75	40-70	30-50	20-30	NP-10
	2-11	Very gravelly loam	GC-GM, GM	A-2, A-1	0	0-10	35-50	25-45	20-40	15-35	15-25	NP-10
	11-38	Extremely gravelly loam, very gravelly loam	GC-GM, GM, GP-GM	A-1, A-2	0	0-15	20-50	15-45	15-40	5-30	15-25	NP-10
	38-60	Extremely gravelly sandy loam, very gravelly loam	GM, GP-GM	A-1	0	0-15	20-45	15-40	10-35	5-25	15-20	NP-5

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
50:												
Radnik----------	0-4	Fine sandy loam	SC-SM, SM	A-2, A-4	0-5	0-5	80-100	75-100	45-70	30-45	20-30	NP-10
	4-60	Fine sandy loam	SC-SM, SM	A-2, A-4	0-5	0-5	80-100	75-100	45-70	30-45	20-30	NP-10
51:												
Riverwash-------	---	---	---	---	---	---	---	---	---	---	---	---
52:												
Royosa----------	0-2	Fine sand	SM	A-2	0	0	100	100	75-85	15-25	---	NP
	2-60	Loamy fine sand, fine sand	SM	A-2	0	0	100	100	50-80	15-35	15-20	NP-5
53:												
Royosa----------	0-2	Fine sand	SM	A-2	0	0	100	100	75-85	15-25	---	NP
	2-60	Loamy fine sand, fine sand	SM	A-2	0	0	100	100	50-80	15-35	15-20	NP-5
Tonalea---------	0-30	Fine sand	SM	A-2	0	0	100	100	65-80	15-25	---	NP
	30-40	Unweathered bedrock			---	---	---	---	---	---	---	---
54:												
Saido-----------	0-1	Silt loam	CL-ML, ML	A-4	0	0	100	100	90-100	80-90	20-30	NP-10
	1-60	Loam, silt loam	CL-ML, ML	A-4	0	0	100	100	90-100	65-90	15-30	NP-10
Brinkerhoff-----	0-4	Loam	ML, CL-ML	A-4	0	0	80-100	75-100	65-95	50-75	20-30	NP-10
	4-17	Sandy loam, gravelly sandy loam	SC-SM, SM	A-1, A-2	0	0	55-95	50-90	30-70	15-35	20-25	NP-10
	17-28	Loamy sand, gravelly loamy sand	SM	A-1, A-2	0	0	55-95	50-90	25-75	10-30	15-25	NP-5
	28-60	Gravelly coarse sand	SP, SP-SM	A-1	0	0	55-100	50-100	25-50	5-10	0-15	NP-5
55:												
Sheppard--------	0-2	Fine sand	SM	A-2	0	0	100	100	65-80	10-20	---	NP
	2-60	Loamy fine sand, fine sand, loamy sand	SM	A-2	0	0	100	90-100	70-80	15-30	---	NP
56:												
Sheppard--------	0-2	Loamy fine sand	SM	A-2	0	0	100	100	65-80	25-35	---	NP
	2-60	Loamy fine sand, fine sand, loamy sand	SM	A-2	0	0	100	90-100	70-80	15-30	---	NP

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
57:												
Showlow---------	0-3	Cobbly silty clay loam	ML, CL	A-4, A-6	0-10	15-45	80-95	70-90	65-85	50-75	30-40	10-15
	3-42	Clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	90-100	70-95	40-65	15-40
	42-52	Gravelly clay loam	CL-ML, CL, SC-SM, SC	A-4, A-6	0	0-10	60-100	55-100	50-100	40-80	30-40	5-15
	52-60	Gravelly loam	SC-SM, SM	A-4	0	0-10	55-80	50-75	40-70	30-50	0-0	NP-10
Section---------	0-2	Gravelly loam	SM, SC-SM	A-4	0	0	55-80	50-75	40-70	30-50	20-30	NP-10
	2-6	Loam	ML, CL-ML	A-4	0	0	95-100	90-100	75-95	55-75	20-30	NP-10
	6-60	Loam	ML, CL-ML	A-4	0	0	95-100	90-100	75-95	55-75	20-30	NP-10
58:												
Showlow---------	0-3	Silty clay loam	CL	A-6	0	0-10	80-100	75-100	70-100	65-85	30-40	10-15
	3-42	Clay loam, silty clay	CH, CL	A-6, A-7	0	0	90-100	85-100	70-100	65-90	35-60	10-35
	42-52	Gravelly clay loam, very gravelly clay loam	SC	A-6	0	0-5	55-80	50-75	45-70	35-50	30-35	10-15
	52-60	Gravelly loam, very gravelly loam	SM, SC-SM	A-2, A-4	0	0-5	50-75	40-70	35-65	25-50	20-30	NP-10
Thimble---------	0-1	Cobbly clay loam	CL	A-6	0-10	15-45	80-95	70-90	70-90	50-70	30-35	10-15
	1-13	Very cobbly clay	CH, CL, SC	A-7	0-10	30-50	60-80	55-75	50-75	40-70	40-65	15-45
	13-19	Very cobbly clay loam	CL, SC	A-6	0-10	30-50	55-80	50-75	45-70	35-65	30-35	10-15
	19-29	Unweathered bedrock			---	---	---	---	---	---	---	---
59:												
Showlow---------	0-3	Very cobbly clay loam	SC, CL	A-2, A-6	0-10	45-65	50-90	45-85	40-80	30-70	30-35	10-15
	3-42	Clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	90-100	70-95	40-65	15-40
	42-52	Gravelly clay loam	CL-ML, CL, SC-SM, SC	A-4, A-6	0	0-10	60-100	55-100	50-100	40-80	30-40	5-15
	52-60	Gravelly loam	SC-SM, SM	A-4	0	0-10	55-80	50-75	40-70	30-50	0-0	NP-10
60:												
Showlow---------	0-3	Very cobbly silty clay loam	SC, CL	A-6	0-10	45-65	50-90	45-85	40-80	35-75	30-40	10-15
	3-42	Clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	90-100	70-95	40-65	15-40
	42-52	Gravelly clay loam	CL-ML, CL, SC-SM, SC	A-4, A-6	0	0-10	60-100	55-100	50-100	40-80	30-40	5-15
	52-60	Gravelly loam	SC-SM, SM	A-4	0	0-10	55-80	50-75	40-70	30-50	0-0	NP-10

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
61:												
Sponiker--------	0-4	Gravelly loam	SM, SC-SM	A-4	0	0-10	55-80	50-75	40-70	30-50	20-30	NP-10
	4-12	Clay loam, gravelly clay loam	CL, SC	A-6	0	0-10	60-90	55-85	50-80	40-70	30-40	10-15
	12-22	Cobbly clay loam, clay loam	CL	A-6	0	15-45	75-90	70-85	65-80	50-75	35-40	10-15
	22-60	Clay, gravelly clay	CH, CL, GC, SC	A-7	0	0-10	60-90	55-85	50-80	45-90	40-65	20-40
62:												
Sponiker--------	0-4	Gravelly loam	SM, SC-SM	A-4	0	0-10	55-80	50-75	40-70	30-50	20-30	NP-10
	4-12	Clay loam, gravelly clay loam	CL, SC	A-6	0	0-10	60-90	55-85	50-80	40-70	30-40	10-15
	12-22	Cobbly clay loam, clay loam	CL	A-6	0	15-45	75-90	70-85	65-80	50-75	35-40	10-15
	22-60	Clay, gravelly clay	CH, CL, GC, SC	A-7	0	0-10	60-90	55-85	50-80	45-90	40-65	20-40
63:												
Torriorthents---	0-60	Variable			---	---	---	---	---	---	---	---
Rock Outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
64:												
Torriorthents---	0-6	Variable			---	---	---	---	---	---	---	---
Rock Outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
65:												
Torriorthents---	0-60	Variable			---	---	---	---	---	---	---	---
Rock Outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
Torriorthents---	---	---	---	---	---	---	---	---	---	---	---	---
66:												
Whiskey---------	0-5	Silt loam	CL-ML, ML	A-4	0	0	80-100	75-100	70-100	50-90	20-35	NP-10
	5-60	Loam	CL-ML	A-4	0	0	80-100	75-100	65-95	50-75	20-30	5-10
67:												
Wukoki----------	0-10	Extremely gravelly loam	GC-GM	A-2	0	0	20-30	15-25	10-25	10-20	25-30	5-10
	10-60	Cinders	GP	A-1	0	0	5-10	0-5	0-5	0-5	0-15	NP
Lomaki----------	0-30	Extremely gravelly loam	GC-GM	A-2	0	0	20-30	15-25	10-25	10-20	25-30	5-10
	30-60	Cinders	GP	A-1	0	0	5-10	0-5	0-5	0-5	0-15	NP

Table 12.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
68:												
Wutoma----------	0-12	Extremely gravelly loam	GM, GC-GM	A-1, A-2	0	0	20-30	15-25	10-25	10-20	20-30	NP-10
	12-60	Cinders	GP	A-1	0	0	5-10	0-5	0-5	0-5	0-15	NP
Lozinta---------	0-10	Extremely gravelly loam	GC, GC-GM	A-1, A-2	0	0	20-30	15-25	15-25	10-20	20-30	NP-10
	10-24	Extremely gravelly loam	GC, GC-GM	A-1, A-2	0	0	20-30	15-25	15-25	10-20	20-30	NP-10
	24-60	Cinders	GP	A-1	0	0	5-10	0-5	0-5	0-5	0-14	NP
69:												
Wutoma----------	0-12	Extremely gravelly loam	GM, GC-GM	A-1, A-2	0	0	20-30	15-25	10-25	10-20	20-30	NP-10
	12-60	Cinders	GP	A-1	0	0	5-10	0-5	0-5	0-5	0-15	NP
Lozinta---------	0-10	Extremely gravelly loam	GC, GC-GM	A-1, A-2	0	0	20-30	15-25	15-25	10-20	20-30	NP-10
	10-24	Extremely gravelly loam	GC, GC-GM	A-1, A-2	0	0	20-30	15-25	15-25	10-20	20-30	NP-10
	24-60	Cinders	GP	A-1	0	0	5-10	0-5	0-5	0-5	0-14	NP
70:												
Wutoma----------	0-12	Stony loam	ML, CL-ML	A-4	10-20	5-10	80-95	75-90	70-80	50-65	20-30	NP-10
	12-60	Cinders	GP	A-1	0	0	5-10	0-5	0-5	0-5	0-15	NP
Rock Outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
71:												
Yumtheska-------	0-2	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0	0-10	30-50	25-45	20-45	15-40	20-30	NP-10
	2-12	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0	0-15	30-50	25-45	20-45	15-40	20-30	NP-10
	12-22	Unweathered bedrock			---	---	---	---	---	---	---	---
71:												
Goesling--------	0-8	Loam	ML, CL-ML	A-4	0	0	95-100	90-100	75-95	55-75	20-30	NP-10
	8-24	Sandy clay loam, clay loam, loam	CL, CL-ML	A-6, A-4	0	0	95-100	90-100	65-90	50-70	25-35	5-15
	24-60	Sandy loam, sandy clay loam, loam	SC-SM	A-2, A-4	0	0	90-100	85-100	50-85	30-50	25-30	5-10
72:												
Yumtheska-------	0-2	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0	0-10	30-50	25-45	20-45	15-40	20-30	NP-10
	2-12	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0	0-15	30-50	25-45	20-45	15-40	20-30	NP-10
	12-22	Unweathered bedrock			---	---	---	---	---	---	---	---
73:												
Yumtheska-------	0-2	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0	0-10	30-50	25-45	20-45	15-40	20-30	NP-10
	2-12	Very gravelly loam	GM, GC-GM	A-1, A-2, A-4	0	0-15	30-50	25-45	20-45	15-40	20-30	NP-10
	12-22	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 13.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
1:												
Badland	---	---	---	---	---	---	---	---	---	-	---	---
2:												
Barx	0-5	10-18	1.25-1.35	2-6	0.12-0.16	0.0-2.9	1.0-3.0	.28	.28	5	3	86
	5-8	18-30	1.20-1.30	0.6-2	0.12-0.18	3.0-5.9	0.5-1.0	.32	.32			
	8-28	22-35	1.25-1.40	0.6-2	0.16-0.19	3.0-5.9	0.5-1.0	.24	.32			
	28-60	16-30	1.25-1.40	0.6-2	0.11-0.18	3.0-5.9	0.5-1.0	.28	.32			
3:												
Barx	0-2	7-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	1.0-3.0	.32	.32	5	5	56
	2-8	18-30	1.20-1.30	0.6-2	0.12-0.18	3.0-5.9	0.5-1.0	.32	.32			
	8-28	22-35	1.25-1.40	0.6-2	0.16-0.19	3.0-5.9	0.5-1.0	.24	.32			
	28-60	16-30	1.25-1.40	0.6-2	0.11-0.18	3.0-5.9	0.5-1.0	.28	.32			
4:												
Begay	0-3	8-15	1.40-1.50	2-6	0.13-0.15	0.0-2.9	1.0-3.0	.28	.28	5	3	86
	3-35	8-15	1.40-1.50	2-6	0.13-0.15	0.0-2.9	1.0-3.0	.28	.28			
	35-55	2-5	1.50-1.60	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.20	.20			
	55-60	8-15	1.40-1.50	2-6	0.13-0.15	0.0-2.9	0.5-1.0	.28	.28			
5:												
Begay	0-3	8-15	1.40-1.50	2-6	0.13-0.15	0.0-2.9	1.0-3.0	.28	.28	5	3	86
	3-35	8-15	1.40-1.50	2-6	0.13-0.15	0.0-2.9	1.0-3.0	.28	.28			
	35-55	2-5	1.50-1.60	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.20	.20			
	55-60	8-15	1.40-1.50	2-6	0.13-0.15	0.0-2.9	0.5-1.0	.28	.28			
6:												
Bidonia	0-1	7-27	1.15-1.25	0.6-2	0.05-0.12	0.0-2.9	1.0-2.0	.10	.32	1	7	38
	1-3	5-27	1.25-1.50	0.6-6	0.07-0.18	0.0-2.9	1.0-2.0	.20	.32			
	3-10	40-60	1.15-1.30	0.06-0.2	0.12-0.16	6.0-8.9	1.0-2.0	.28	.32			
	10-14	27-35	1.25-1.50	0.2-0.6	0.12-0.18	3.0-5.9	1.0-2.0	.17	.32			
	14-24	---	---	0.06-0.2	---	---	---	---	---			
Bond	0-5	8-18	1.25-1.55	2-6	0.07-0.15	0.0-2.9	0.7-0.9	.15	.24	1	4	86
	5-17	20-35	1.55-1.75	0.2-0.6	0.12-0.19	3.0-5.9	0.4-0.6	.24	.32			
	17-19	20-35	1.55-1.75	0.2-0.6	0.12-0.19	3.0-5.9	0.4-0.6	.24	.32			
	19-29	---	---	0.06-0.2	---	---	---	---	---			
Rock Outcrop	---	---	---	---	---	---	---	---	---	-	---	---
7:												
Bond	0-5	8-18	1.25-1.55	2-6	0.07-0.15	0.0-2.9	0.8-1.0	.20	.28	1	3	86
	5-17	20-35	1.55-1.75	0.2-0.6	0.12-0.19	3.0-5.9	0.4-0.6	.24	.32			
	17-19	20-35	1.55-1.75	0.2-0.6	0.12-0.19	3.0-5.9	0.4-0.6	.24	.32			
	19-29	---	---	0.06-0.2	---	---	---	---	---			
Bidonia	0-1	5-18	1.20-1.35	2-6	0.10-0.13	0.0-2.9	1.0-2.0	.20	.24	1	3	86
	1-3	5-27	1.25-1.50	0.6-6	0.07-0.18	0.0-2.9	1.0-2.0	.17	.32			
	3-10	40-60	1.15-1.30	0.06-0.2	0.12-0.16	6.0-8.9	1.0-2.0	.28	.32			
	10-14	27-35	1.25-1.50	0.2-0.6	0.12-0.18	3.0-5.9	1.0-2.0	.17	.32			
	14-24	---	---	0.06-0.2	---	---	---	---	---			

Table 13.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
8:												
Brinkerhoff---------	0-4	5-18	1.25-1.35	2-6	0.09-0.13	0.0-2.9	0.5-1.0	.20	.24	5	3	86
	4-17	7-17	1.35-1.50	2-6	0.07-0.13	0.0-2.9	0.5-1.0	.15	.24			
	17-28	0-15	1.45-1.55	6-20	0.04-0.08	0.0-2.9	0.5-1.0	.10	.17			
	28-60	0-10	1.45-1.55	20-20	0.03-0.05	0.0-2.9	0.5-1.0	.05	.10			
Grieta--------------	0-3	10-18	1.45-1.55	2-6	0.12-0.14	0.0-2.9	0.5-1.0	.24	.28	5	3	86
	3-25	18-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	0.0-0.5	.28	.32			
	25-60	18-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	0.0-0.5	.28	.32			
9:												
Campanile-----------	0-60	40-60	1.05-1.15	0.06-0.2	0.14-0.16	6.0-8.9	1.0-2.0	.32	.32	5	4	86
10:												
Clayhole------------	0-2	7-27	1.15-1.25	0.6-2	0.10-0.14	0.0-2.9	0.5-1.0	.28	.32	5	5	56
	2-60	18-27	1.25-1.50	0.6-2	0.10-0.14	0.0-2.9	0.5-1.0	.32	.37			
11:												
Curhollow-----------	0-2	7-27	1.15-1.25	0.6-2	0.10-0.15	0.0-2.9	1.0-2.0	.20	.32	1	6	48
	2-12	18-27	1.15-1.25	0.6-2	0.05-0.12	0.0-2.9	0.4-2.0	.10	.32			
	12-22	---	---	---	---	---	---	---	---			
	22-32	---	---	---	---	---	---	---	---			
Prieta--------------	0-2	7-27	1.15-1.25	0.6-2	0.05-0.12	0.0-2.9	1.0-2.0	.10	.32	1	7	38
	2-6	27-35	1.15-1.30	0.2-0.6	0.07-0.14	3.0-5.9	0.4-1.0	.15	.37			
	6-16	40-60	1.15-1.30	0.06-0.2	0.06-0.11	3.0-5.9	0.4-0.6	.15	.37			
	16-26	---	---	---	---	---	---	---	---			
12:												
Godding-------------	0-5	7-27	1.15-1.25	0.6-2	0.10-0.15	0.0-2.9	2.0-4.0	.20	.32	5	6	48
	5-12	27-35	1.25-1.50	0.2-0.6	0.12-0.18	3.0-5.9	2.0-4.0	.20	.32			
	12-41	40-50	1.15-1.30	0.06-0.2	0.05-0.10	6.0-8.9	2.0-4.0	.10	.32			
	41-60	27-35	1.25-1.50	0.2-0.6	0.07-0.14	0.0-2.9	1.0-3.0	.10	.32			
13:												
Grieta--------------	0-3	10-18	1.45-1.55	2-6	0.12-0.14	0.0-2.9	0.5-1.0	.24	.28	5	3	86
	3-25	18-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	0.0-0.5	.28	.32			
	25-60	18-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	0.0-0.5	.28	.32			
14:												
Grieta--------------	0-3	7-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	0.5-1.0	.28	.32	5	5	56
	3-25	18-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	0.0-0.5	.28	.32			
	25-60	18-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	0.0-0.5	.28	.32			
15:												
Gypsids-------------	0-2	---	---	---	---	0.0-2.9	0.5-1.0	---	---	5	---	---
	2-13	---	---	---	---	0.0-2.9	0.5-1.0	---	---			
	13-31	---	---	---	---	0.0-2.9	0.5-1.0	---	---			
	31-60	---	---	---	---	0.0-2.9	0.5-1.0	---	---			
Gypsids, Shallow----	0-1	---	---	---	---	0.0-2.9	0.5-1.0	---	---	2	---	---
	1-7	---	---	---	---	0.0-2.9	0.5-1.0	---	---			
	7-20	---	---	---	---	0.0-2.9	0.5-1.0	---	---			

Table 13.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
16:												
Hatknoll------------	0-3	27-35	1.05-1.15	0.2-0.6	0.19-0.21	3.0-5.9	0.5-1.0	.37	.37	5	7	38
	3-20	40-60	1.15-1.30	0.06-0.2	0.13-0.17	6.0-8.9	0.5-1.0	.32	.37			
	20-25	40-60	1.15-1.30	0.06-0.2	0.10-0.14	6.0-8.9	0.5-1.0	.20	.37			
	25-60	7-27	1.25-1.50	0.6-2	0.15-0.18	0.0-2.9	0.5-1.0	.32	.32			
Kinan---------------	0-7	10-20	1.25-1.40	0.6-2	0.08-0.10	0.0-2.9	0.5-1.0	.24	.32	4	5	56
	7-14	10-17	1.25-1.40	0.6-2	0.08-0.10	0.0-2.9	0.0-0.5	.24	.32			
	14-44	10-17	1.25-1.40	0.6-2	0.11-0.14	0.0-2.9	0.0-0.5	.28	.32			
	44-60	10-25	1.25-1.40	0.6-2	0.07-0.10	0.0-2.9	0.0-0.5	.15	.32			
17:												
Havasupai-----------	0-2	15-25	1.25-1.40	0.6-2	0.10-0.12	0.0-2.9	1.0-3.0	.15	.32	1	6	48
	2-9	15-25	1.25-1.50	0.6-2	0.08-0.14	0.0-2.9	0.0-0.5	.15	.32			
	9-17	18-27	1.25-1.50	0.6-2	0.04-0.10	0.0-2.9	0.0-0.5	.10	.32			
	17-35	0-0	---	---	0.00-0.00	---	---	---	---			
	35-60	5-15	1.35-1.60	6-20	0.02-0.03	0.0-2.9	0.0-0.5	.05	.10			
Mellenthin----------	0-8	7-27	1.15-1.25	0.6-2	0.05-0.12	0.0-2.9	1.0-2.0	.10	.32	1	6	48
	8-15	7-27	1.25-1.50	0.6-2	0.05-0.12	0.0-2.9	0.5-1.0	.10	.32			
	15-25	---	---	0.06-0.6	---	---	---	---	---			
18:												
Jocity--------------	0-4	0-15	1.35-1.45	6-20	0.05-0.09	0.0-2.9	0.5-1.0	.15	.20	5	2	134
	4-60	18-27	1.25-1.40	0.2-0.6	0.09-0.11	0.0-2.9	0.5-1.0	.37	.37			
19:												
Jocity--------------	0-4	27-35	1.05-1.15	0.2-0.6	0.19-0.21	3.0-5.9	0.0-0.5	.37	.37	5	7	38
	4-60	18-27	1.30-1.40	0.2-0.6	0.18-0.20	3.0-5.9	0.0-0.5	.32	.32			
Clayhole------------	0-2	27-35	1.15-1.30	0.2-0.6	0.12-0.16	3.0-5.9	0.5-1.0	.32	.37	5	7	38
	2-60	18-27	1.25-1.50	0.6-2	0.10-0.14	0.0-2.9	0.5-1.0	.32	.37			
20:												
Jocity--------------	0-4	27-40	1.25-1.55	0.2-0.6	0.16-0.21	3.0-5.9	0.5-1.0	.37	.37	5	7	38
	4-11	40-55	1.15-1.55	0.2-0.06	0.11-0.16	6.0-8.9	0.5-1.0	.24	.32			
	11-15	10-18	1.25-1.55	2-6	0.08-0.15	0.0-2.9	0.5-1.0	.24	.28			
	15-33	27-35	1.25-1.55	0.2-0.6	0.16-0.21	3.0-5.9	0.5-1.0	.32	.32			
	33-60	10-18	1.25-1.55	2-6	0.08-0.15	0.0-2.9	0.5-1.0	.24	.28			
21:												
Jocity--------------	0-4	27-35	1.05-1.15	0.2-0.6	0.19-0.21	3.0-5.9	0.0-0.5	.37	.37	5	7	38
	4-60	18-27	1.30-1.40	0.2-0.6	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
22:												
Kinan---------------	0-7	10-20	1.25-1.40	0.6-2	0.08-0.10	0.0-2.9	0.5-1.0	.20	.32	4	6	48
	7-14	10-17	1.25-1.40	0.6-2	0.08-0.10	0.0-2.9	0.0-0.5	.20	.32			
	14-44	10-17	1.25-1.40	0.6-2	0.11-0.14	0.0-2.9	0.0-0.5	.32	.32			
	44-60	10-25	1.25-1.40	0.6-2	0.07-0.10	0.0-2.9	0.0-0.5	.15	.32			
23:												
Kinan---------------	0-7	10-20	1.25-1.40	0.6-2	0.11-0.14	0.0-2.9	0.5-1.0	.32	.32	4	6	48
	7-14	10-17	1.25-1.40	0.6-2	0.08-0.10	0.0-2.9	0.0-0.5	.20	.32			
	14-44	10-17	1.25-1.40	0.6-2	0.11-0.14	0.0-2.9	0.0-0.5	.32	.32			
	44-60	10-25	1.25-1.40	0.6-2	0.07-0.10	0.0-2.9	0.0-0.5	.15	.32			
Hatknoll------------	0-3	27-35	1.05-1.15	0.2-0.6	0.19-0.21	3.0-5.9	0.5-1.0	.37	.37	5	7	38
	3-20	40-60	1.15-1.30	0.06-0.2	0.13-0.17	6.0-8.9	0.5-1.0	.32	.37			
	20-25	40-60	1.15-1.30	0.06-0.2	0.10-0.14	6.0-8.9	0.5-1.0	.24	.37			
	25-60	7-27	1.25-1.50	0.6-2	0.15-0.18	0.0-2.9	0.5-1.0	.32	.32			

Table 13.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
23:												
Grieta	0-3	7-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	0.5-1.0	.28	.32	5	5	56
	3-25	18-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	0.0-0.5	.28	.32			
	25-60	18-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	0.0-0.5	.28	.32			
24:												
Kinan	0-7	10-20	1.25-1.40	0.6-2	0.08-0.10	0.0-2.9	0.5-1.0	.24	.32	4	6	48
	7-14	10-17	1.25-1.40	0.6-2	0.08-0.10	0.0-2.9	0.0-0.5	.24	.32			
	14-44	10-17	1.25-1.40	0.6-2	0.11-0.14	0.0-2.9	0.0-0.5	.32	.32			
	44-60	10-25	1.25-1.40	0.6-2	0.07-0.10	0.0-2.9	0.0-0.5	.15	.32			
Pennell	0-2	10-20	1.25-1.55	0.6-2	0.10-0.15	0.0-2.9	0.0-0.5	.20	.32	1	6	48
	2-9	10-15	1.35-1.55	2-6	0.07-0.13	0.0-2.9	0.0-0.5	.15	.24			
	9-12	10-15	1.35-1.55	2-6	0.05-0.11	0.0-2.9	0.0-0.5	.10	.24			
	12-22	---	---	0.06-0.2	---	---	---	---	---			
25:												
Klondike	0-2	20-35	1.15-1.25	0.2-0.6	0.12-0.16	3.0-5.9	0.5-1.0	.24	.32	1	5	56
	2-11	18-30	1.25-1.50	0.2-0.6	0.10-0.18	0.0-2.9	0.5-1.0	.24	.32			
	11-21	---	---	0.2-2	---	---	---	---	---			
26:												
Lava Flows	---	---	---	---	---	---	---	---	---	-	---	---
27:												
Lozinta	0-10	7-27	1.00-1.05	0.6-2	0.04-0.07	0.0-2.9	0.5-1.0	.05	.32	3	8	0
	10-24	7-27	1.00-1.05	0.6-2	0.04-0.07	0.0-2.9	0.4-0.6	.05	.32			
	24-60	0-1	---	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.02	.02			
28:												
Lozinta	0-10	7-27	1.00-1.05	0.6-2	0.04-0.07	0.0-2.9	0.5-1.0	.05	.32	3	8	0
	10-24	7-27	1.00-1.05	0.6-2	0.04-0.07	0.0-2.9	0.4-0.6	.05	.32			
	24-60	0-1	---	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.02	.02			
29:												
Manikan	0-4	30-38	1.05-1.15	0.2-0.6	0.19-0.21	3.0-5.9	1.0-2.0	.37	.37	5	4L	86
	4-60	18-27	1.30-1.40	0.6-2	0.19-0.21	0.0-2.9	0.5-1.0	.43	.43			
30:												
Mellenthin	0-8	10-15	1.25-1.35	2-6	0.10-0.13	0.0-2.9	0.8-2.0	.15	.28	1	4	86
	8-15	10-15	1.25-1.35	0.6-2	0.06-0.08	0.0-2.9	0.5-1.0	.10	.32			
	15-25	---	---	0.06-0.2	---	---	---	---	---			
Anasazi	0-12	12-17	1.20-1.30	2-6	0.08-0.13	0.0-2.9	1.0-3.0	.24	.32	2	6	48
	12-23	9-17	1.35-1.50	2-6	0.08-0.14	0.0-2.9	0.5-1.0	.15	.32			
	23-33	---	---	---	---	---	---	---	---			
31:												
Mellenthin	0-8	7-27	1.25-1.35	0.6-2	0.10-0.15	0.0-2.9	0.8-2.0	.24	.32	1	5	56
	8-15	10-15	1.25-1.35	0.6-2	0.06-0.08	0.0-2.9	0.5-1.0	.10	.32			
	15-25	---	---	0.06-0.2	---	---	---	---	---			
Barx	0-2	7-27	1.15-1.25	0.6-2	0.10-0.15	0.0-2.9	1.0-2.0	.24	.32	5	6	48
	2-8	18-30	1.20-1.30	0.6-2	0.12-0.18	3.0-5.9	0.4-1.0	.28	.32			
	8-28	22-35	1.25-1.40	0.6-2	0.16-0.19	3.0-5.9	0.4-1.0	.28	.32			
	28-60	16-30	1.25-1.40	0.6-2	0.11-0.18	3.0-5.9	0.4-1.0	.28	.32			

Table 13.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
32:												
Mellenthin----------	0-8	7-27	1.25-1.35	0.6-2	0.10-0.15	0.0-2.9	0.8-2.0	.24	.32	1	5	56
	8-15	10-15	1.25-1.35	0.6-2	0.06-0.08	0.0-2.9	0.5-1.0	.10	.32			
	15-25	---	---	0.06-0.2	---	---	---	---	---			
Progresso-----------	0-4	15-18	1.45-1.55	2-6	0.10-0.14	0.0-2.9	0.5-1.0	.20	.24	2	3	86
	4-27	20-35	1.25-1.35	0.6-2	0.17-0.19	3.0-5.9	0.5-1.0	.32	.32			
	27-37	---	---	0.06-0.2	---	---	---	---	---			
33:												
Mellenthin----------	0-8	7-27	1.15-1.25	0.6-2	0.05-0.12	0.0-2.9	1.0-2.0	.10	.32	1	8	0
	8-15	7-27	1.25-1.50	0.6-2	0.05-0.12	0.0-2.9	0.5-1.0	.10	.32			
	15-25	---	---	0.06-0.6	---	---	---	---	---			
34:												
Mellenthin----------	0-8	7-27	1.15-1.25	0.6-2	0.05-0.12	0.0-2.9	1.0-2.0	.10	.32	1	7	38
	8-15	7-27	1.25-1.50	0.6-2	0.05-0.12	0.0-2.9	0.5-1.0	.10	.32			
	15-25	---	---	0.06-0.6	---	---	---	---	---			
35:												
Mellenthin----------	0-8	7-27	1.15-1.25	0.6-2	0.05-0.12	0.0-2.9	1.0-2.0	.10	.32	1	6	48
	8-15	7-27	1.25-1.50	0.6-2	0.05-0.12	0.0-2.9	0.5-1.0	.10	.32			
	15-25	---	---	0.06-0.6	---	---	---	---	---			
36:												
Mellenthin----------	0-8	7-27	1.15-1.25	0.6-2	0.05-0.12	0.0-2.9	1.0-2.0	.10	.32	1	8	0
	8-15	7-27	1.25-1.50	0.6-2	0.05-0.12	0.0-2.9	0.5-1.0	.10	.32			
	15-25	---	---	0.06-0.6	---	---	---	---	---			
37:												
Mido----------------	0-2	1-5	1.50-1.60	6-20	0.05-0.07	0.0-2.9	0.5-1.0	.17	.17	5	1	310
	2-60	3-8	1.40-1.50	6-20	0.05-0.09	0.0-2.9	0.5-1.0	.17	.17			
38:												
Mido----------------	0-2	2-10	1.40-1.50	6-20	0.08-0.10	0.0-2.9	0.5-1.0	.20	.20	5	2	134
	2-60	3-8	1.40-1.50	6-20	0.05-0.09	0.0-2.9	0.5-1.0	.17	.17			
39:												
Milok---------------	0-3	7-27	1.30-1.40	0.6-2	0.10-0.16	0.0-2.9	1.0-2.0	.20	.32	5	6	48
	3-11	7-17	1.30-1.40	0.6-2	0.14-0.16	0.0-2.9	0.5-1.0	.32	.32			
	11-30	5-17	1.35-1.45	2-6	0.09-0.10	0.0-2.9	0.5-1.0	.24	.24			
	30-60	5-17	1.35-1.40	2-6	0.07-0.09	0.0-2.9	0.0-0.5	.15	.24			
40:												
Moab----------------	0-2	10-20	1.25-1.30	0.6-2	0.14-0.17	0.0-2.9	0.5-1.0	.32	.32	2	5	56
	2-11	10-17	1.25-1.30	2-6	0.05-0.08	0.0-2.9	0.0-0.5	.10	.32			
	11-38	10-17	1.25-1.30	2-6	0.04-0.07	0.0-2.9	0.0-0.5	.10	.32			
	38-60	10-15	1.30-1.35	2-6	0.04-0.06	0.0-2.9	0.0-0.5	.10	.32			
41:												
Moab----------------	0-2	7-27	1.15-1.25	0.6-2	0.10-0.15	0.0-2.9	0.5-1.0	.24	.32	2	6	56
	2-11	10-17	1.25-1.30	2-6	0.05-0.08	0.0-2.9	0.0-0.5	.10	.32			
	11-38	10-17	1.25-1.30	2-6	0.04-0.07	0.0-2.9	0.0-0.5	.10	.32			
	38-60	10-15	1.30-1.35	2-6	0.04-0.06	0.0-2.9	0.0-0.5	.10	.32			
Mellenthin----------	0-8	7-27	1.15-1.25	0.6-2	0.05-0.12	0.0-2.9	1.0-2.0	.10	.32	1	8	0
	8-15	7-27	1.25-1.50	0.6-2	0.05-0.12	0.0-2.9	0.5-1.0	.10	.32			
	15-25	---	---	0.06-0.6	---	---	---	---	---			

Table 13.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
42:												
Monue---------------	0-5	10-18	1.35-1.40	2-6	0.13-0.15	0.0-2.9	0.5-1.0	.28	.28	5	3	86
	5-40	10-17	1.35-1.40	2-6	0.13-0.15	0.0-2.9	0.4-0.6	.28	.28			
	40-46	27-35	1.20-1.25	0.2-0.6	0.19-0.21	3.0-5.9	0.4-0.6	.37	.37			
	46-60	7-20	1.25-1.40	0.6-2	0.12-0.18	0.0-2.9	0.4-0.6	.28	.32			
43:												
Padilla-------------	0-2	40-50	1.15-1.30	0.06-0.2	0.14-0.17	6.0-8.9	1.0-2.0	.32	.32	5	4	86
	2-60	35-50	1.15-1.30	0.06-0.2	0.14-0.17	6.0-8.9	0.4-1.0	.32	.32			
Penistaja-----------	0-5	10-18	1.45-1.55	2-6	0.12-0.14	0.0-2.9	0.5-1.0	.28	.28	5	3	86
	5-19	20-30	1.40-1.50	0.6-2	0.13-0.17	3.0-5.9	0.4-0.6	.32	.32			
	19-42	10-18	1.45-1.55	2-6	0.12-0.14	0.0-2.9	0.0-0.5	.28	.28			
	42-60	27-35	1.20-1.25	0.2-0.6	0.19-0.21	3.0-5.9	0.0-0.5	.37	.37			
Campanile-----------	0-60	40-60	1.05-1.15	0.06-0.2	0.14-0.16	6.0-8.9	1.0-2.0	.32	.32	5	4	86
44:												
Palma---------------	0-8	5-10	1.45-1.65	6-20	0.08-0.12	0.0-2.9	0.4-0.6	.20	.20	5	2	134
	8-33	10-17	1.25-1.55	2-6	0.08-0.15	0.0-2.9	0.2-0.5	.28	.28			
	33-60	10-15	1.25-1.55	2-6	0.08-0.15	0.0-2.9	0.2-0.5	.28	.28			
45:												
Penistaja-----------	0-5	10-18	1.45-1.55	2-6	0.12-0.14	0.0-2.9	0.5-1.0	.28	.28	5	3	86
	5-19	20-30	1.40-1.50	0.6-2	0.13-0.17	3.0-5.9	0.4-0.6	.32	.32			
	19-42	10-18	1.45-1.55	2-6	0.12-0.14	0.0-2.9	0.0-0.5	.28	.28			
	42-60	27-35	1.20-1.25	0.2-0.6	0.19-0.21	3.0-5.9	0.0-0.5	.37	.37			
46:												
Pennell-------------	0-2	10-15	1.35-1.55	2-6	0.06-0.11	0.0-2.9	0.0-0.5	.15	.24	1	5	56
	2-9	10-15	1.35-1.55	2-6	0.07-0.13	0.0-2.9	0.0-0.5	.17	.24			
	9-12	10-15	1.35-1.55	2-6	0.05-0.11	0.0-2.9	0.0-0.5	.15	.24			
	12-22	---	---	0.06-0.2	---	---	---	---	---			
Bacobi--------------	0-2	5-15	1.35-1.55	2-6	0.07-0.13	0.0-2.9	0.5-1.0	.17	.24	2	3	86
	2-13	20-27	1.55-1.75	0.2-0.6	0.12-0.19	0.0-2.9	0.2-0.6	.32	.32			
	13-28	20-27	1.55-1.75	0.2-0.6	0.12-0.19	0.0-2.9	0.2-0.6	.32	.32			
	28-32	10-15	1.35-1.55	2-6	0.07-0.13	0.0-2.9	0.0-0.5	.24	.24			
	32-42	---	---	0.2-0.6	---	---	---	---	---			
47:												
Pennell-------------	0-2	10-20	1.25-1.55	0.6-2	0.10-0.15	0.0-2.9	0.0-0.5	.20	.32	1	6	48
	2-9	10-15	1.35-1.55	2-6	0.07-0.13	0.0-2.9	0.0-0.5	.17	.24			
	9-12	10-15	1.35-1.55	2-6	0.05-0.11	0.0-2.9	0.0-0.5	.15	.24			
	12-22	---	---	0.06-0.2	---	---	---	---	---			
48:												
Poley---------------	0-2	27-35	1.15-1.30	0.2-0.6	0.12-0.18	3.0-5.9	0.5-1.0	.24	.37	2	8	0
	2-18	27-60	1.15-1.30	0.06-0.2	0.13-0.21	3.0-5.9	0.4-0.6	.32	.37			
	18-36	20-35	1.15-1.30	0.2-2	0.16-0.21	3.0-5.9	0.2-0.5	.37	.43			
	36-49	27-35	1.25-1.50	0.2-0.6	0.07-0.14	3.0-5.9	0.2-0.5	.20	.32			
	49-60	7-27	1.25-1.50	0.6-2	0.04-0.07	0.0-2.9	0.2-0.5	.05	.32			

Table 13.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
49:												
Poley	0-2	7-27	1.15-1.30	0.6-2	0.07-0.14	0.0-2.9	0.5-1.0	.15	.43	4	7	38
	2-18	27-60	1.15-1.30	0.06-0.2	0.13-0.21	3.0-5.9	0.4-0.6	.32	.37			
	18-36	20-35	1.15-1.30	0.2-2	0.16-0.21	3.0-5.9	0.2-0.5	.37	.43			
	36-49	27-35	1.25-1.50	0.2-0.6	0.07-0.14	3.0-5.9	0.2-0.5	.20	.32			
	49-60	7-27	1.25-1.50	0.6-2	0.04-0.07	0.0-2.9	0.2-0.5	.05	.32			
Moab	0-2	7-27	1.15-1.25	0.6-2	0.10-0.15	0.0-2.9	0.5-1.0	.15	.32	2	6	48
	2-11	10-17	1.25-1.30	2-6	0.05-0.08	0.0-2.9	0.0-0.5	.10	.32			
	11-38	10-17	1.25-1.30	2-6	0.04-0.07	0.0-2.9	0.0-0.5	.10	.32			
	38-60	10-15	1.30-1.35	2-6	0.04-0.06	0.0-2.9	0.0-0.5	.10	.32			
50:												
Radnik	0-4	5-18	1.25-1.35	2-6	0.11-0.13	0.0-2.9	1.0-2.0	.24	.28	5	3	86
	4-60	5-17	1.35-1.50	2-6	0.11-0.13	0.0-2.9	1.0-2.0	.24	.28			
51:												
Riverwash	---	---	---	---	---	---	---	---	---	-	---	---
52:												
Royosa	0-2	2-6	1.35-1.45	20-20	0.05-0.07	0.0-2.9	1.0-3.0	.17	.17	5	1	220
	2-60	3-10	1.45-1.55	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.20	.20			
53:												
Royosa	0-2	2-6	1.35-1.45	20-20	0.05-0.07	0.0-2.9	1.0-3.0	.17	.17	5	1	220
	2-60	3-10	1.45-1.55	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.20	.20			
Tonalea	0-30	0-5	1.35-1.45	6-20	0.05-0.07	0.0-2.9	0.5-2.0	.17	.17	2	1	160
	30-40	---	---	---	---	---	---	---	---			
54:												
Saido	0-1	10-15	1.35-1.45	0.6-2	0.17-0.19	0.0-2.9	0.2-0.6	.43	.43	5	5	56
	1-60	10-17	1.05-1.15	0.6-2	0.19-0.21	0.0-2.9	0.2-0.6	.43	.43			
Brinkerhoff	0-4	7-27	1.25-1.50	0.6-2	0.10-0.18	0.0-2.9	0.5-1.0	.32	.32	5	5	56
	4-17	7-17	1.35-1.50	2-6	0.07-0.13	0.0-2.9	0.4-0.6	.20	.24			
	17-28	0-15	1.45-1.55	6-20	0.04-0.08	0.0-2.9	0.4-0.6	.15	.17			
	28-60	0-10	1.45-1.55	20-20	0.03-0.05	0.0-2.9	0.4-0.6	.05	.10			
55:												
Sheppard	0-2	2-5	1.50-1.60	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.17	.17	5	1	310
	2-60	3-8	1.50-1.60	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.20	.20			
56:												
Sheppard	0-2	2-5	1.50-1.60	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.20	.20	5	2	134
	2-60	3-8	1.50-1.60	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.20	.20			
57:												
Showlow	0-3	27-35	1.25-1.55	0.2-0.6	0.04-0.15	3.0-5.9	1.0-3.0	.15	.37	5	8	0
	3-42	35-60	1.35-1.55	0.2-0.6	0.16-0.21	9.0-25.0	0.5-3.0	.37	.37			
	42-52	27-35	1.25-1.55	0.2-0.6	0.10-0.21	3.0-5.9	0.5-2.0	.17	.32			
	52-60	7-27	1.25-1.55	0.6-2	0.08-0.18	3.0-5.9	0.5-2.0	.17	.32			
Section	0-2	7-27	1.15-1.25	0.6-2	0.10-0.15	0.0-2.9	0.5-2.0	.20	.32	5	5	56
	2-6	7-27	1.25-1.50	0.6-2	0.14-0.18	0.0-2.9	0.5-2.0	.32	.32			
	6-60	7-27	1.25-1.50	0.6-2	0.14-0.18	0.0-2.9	0.5-2.0	.32	.32			

Table 13.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
58:												
Showlow-------------	0-3	27-35	1.15-1.30	0.2-0.6	0.16-0.21	3.0-5.9	1.0-3.0	.28	.37	5	7	38
	3-42	35-60	1.15-1.50	0.06-0.2	0.17-0.21	6.0-8.9	0.5-3.0	.32	.37			
	42-52	27-35	1.25-1.50	0.2-0.6	0.12-0.18	3.0-5.9	0.5-2.0	.20	.32			
	52-60	7-27	1.25-1.50	0.6-2	0.10-0.15	0.0-2.9	0.5-2.0	.15	.32			
Thimble-------------	0-1	27-35	1.15-1.25	0.2-0.6	0.12-0.18	3.0-5.9	1.0-2.0	.15	.32	1	7	38
	1-13	40-60	1.05-1.15	0.06-0.2	0.05-0.09	6.0-8.9	1.0-2.0	.17	.32			
	13-19	27-35	1.25-1.50	0.2-0.6	0.07-0.14	3.0-5.9	1.0-2.0	.17	.32			
	19-29	---	---	---	---	---	---	---	---			
59:												
Showlow-------------	0-3	27-35	1.25-1.55	0.2-0.6	0.04-0.15	3.0-5.9	1.0-3.0	.10	.32	5	8	0
	3-42	35-60	1.35-1.55	0.2-0.6	0.16-0.21	9.0-25.0	1.5-3.0	.37	.37			
	42-52	27-35	1.25-1.55	0.2-0.6	0.10-0.21	3.0-5.9	0.5-2.0	.10	.32			
	52-60	7-27	1.25-1.55	0.6-2	0.08-0.18	3.0-5.9	0.5-2.0	.10	.32			
60:												
Showlow-------------	0-3	27-35	1.25-1.55	0.2-0.6	0.04-0.15	3.0-5.9	1.0-3.0	.15	.37	5	8	0
	3-42	35-60	1.35-1.55	0.2-0.6	0.16-0.21	9.0-25.0	1.0-3.0	.37	.37			
	42-52	27-35	1.25-1.55	0.2-0.6	0.10-0.21	3.0-5.9	0.5-2.0	.10	.32			
	52-60	7-27	1.25-1.55	0.6-2	0.08-0.18	3.0-5.9	0.5-2.0	.10	.32			
61:												
Sponiker------------	0-4	7-27	1.15-1.25	0.6-2	0.10-0.18	0.0-2.9	2.0-4.0	.20	.32	5	6	48
	4-12	27-38	1.25-1.50	0.2-0.6	0.12-0.21	3.0-5.9	2.0-4.0	.24	.32			
	12-22	35-38	1.25-1.50	0.2-0.6	0.12-0.21	3.0-5.9	2.0-4.0	.17	.32			
	22-60	40-60	1.15-1.30	0.06-0.2	0.09-0.16	6.0-8.9	2.0-4.0	.20	.32			
62:												
Sponiker------------	0-4	7-27	1.15-1.25	0.6-2	0.10-0.18	0.0-2.9	2.0-4.0	.20	.32	5	6	48
	4-12	27-38	1.25-1.50	0.2-0.6	0.12-0.21	3.0-5.9	2.0-4.0	.24	.32			
	12-22	35-38	1.25-1.50	0.2-0.6	0.12-0.21	3.0-5.9	2.0-4.0	.17	.32			
	22-60	40-60	1.15-1.30	0.06-0.2	0.09-0.16	6.0-8.9	2.0-4.0	.20	.32			
63:												
Torriorthents-------	0-60	---	---	---	---	---	---	---	---	2	---	---
Rock Outcrop--------	---	---	---	---	---	---	---	---	---	-	---	---
64:												
Torriorthents-------	0-60	---	---	---	---	---	---	---	---	2	---	---
Rock Outcrop--------	---	---	---	---	---	---	---	---	---	-	---	---
65:												
Torriorthents-------	0-60	---	---	---	---	---	---	---	---	2	---	---
Rock Outcrop--------	---	---	---	---	---	---	---	---	---	-	---	---
Torriorthents-------	---	---	---	---	---	---	---	---	---	-	---	---
66:												
Whiskey-------------	0-5	5-27	1.05-1.15	0.6-2	0.16-0.21	0.0-2.9	1.0-3.0	.32	.43	5	5	56
	5-60	18-27	1.25-1.50	0.6-2	0.14-0.18	0.0-2.9	1.0-3.0	.28	.32			
67:												
Wukoki--------------	0-10	18-27	1.00-1.05	0.6-2	0.04-0.07	0.0-2.9	1.0-2.0	.02	.32	2	8	0
	10-60	0-1	---	20-20	0.03-0.05	0.0-2.9	0.0-0.5	.02	.02			

Table 13.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
67:												
Lomaki--------------	0-30	18-25	1.00-1.05	0.6-2	0.05-0.08	0.0-2.9	1.0-2.0	.02	.32	3	8	0
	30-60	0-1	---	20-20	0.03-0.05	0.0-2.9	0.5-1.0	.02	.02			
68:												
Wutoma--------------	0-12	7-27	1.05-1.10	0.6-2	0.04-0.07	0.0-2.9	0.5-1.0	.02	.32	2	8	0
	12-60	0-1	---	20-20	0.03-0.05	0.0-2.9	0.0-0.5	.02	.02			
Lozinta-------------	0-10	7-27	1.00-1.05	0.6-2	0.04-0.07	0.0-2.9	1.0-2.0	.05	.32	3	8	0
	10-24	7-27	1.00-1.05	0.6-2	0.04-0.07	0.0-2.9	0.5-1.0	.05	.32			
	24-60	0-1	---	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.02	.02			
69:												
Wutoma--------------	0-12	7-27	1.05-1.10	0.6-2	0.04-0.07	0.0-2.9	0.5-1.0	.02	.32	2	8	0
	12-60	0-1	---	20-20	0.03-0.05	0.0-2.9	0.0-0.5	.02	.02			
Lozinta-------------	0-10	7-27	1.00-1.05	0.6-2	0.04-0.07	0.0-2.9	1.0-2.0	.02	.32	3	8	0
	10-24	7-27	1.00-1.05	0.6-2	0.04-0.07	0.0-2.9	0.5-1.0	.05	.32			
	24-60	0-1	---	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.02	.02			
70:												
Wutoma--------------	0-12	7-27	1.05-1.10	0.6-2	0.09-0.11	0.0-2.9	0.5-1.0	.15	.32	2	6	48
	12-60	0-1	---	20-20	0.03-0.05	0.0-2.9	0.0-0.5	.02	.02			
Rock Outcrop--------	---	---	---	---	---	---	---	---	---	-	---	---
71:												
Yumtheska-----------	0-2	7-27	1.25-1.50	0.6-2	0.05-0.10	0.0-2.9	1.0-3.0	.10	.32	1	8	0
	2-12	7-27	1.25-1.50	0.6-2	0.05-0.10	0.0-2.9	1.0-3.0	.10	.32			
	12-22	---	---	---	---	---	---	---	---			
Goesling------------	0-8	7-27	1.15-1.25	0.6-2	0.14-0.18	0.0-2.9	1.0-3.0	.28	.32	5	6	48
	8-24	18-35	1.45-1.55	0.2-0.6	0.17-0.19	3.0-5.9	0.5-1.0	.32	.32			
	24-60	16-30	1.40-1.50	0.2-0.6	0.13-0.15	0.0-2.9	0.5-1.0	.32	.32			
72:												
Yumtheska-----------	0-2	7-27	1.25-1.50	0.6-2	0.05-0.10	0.0-2.9	1.0-3.0	.10	.32	1	7	38
	2-12	7-27	1.25-1.50	0.6-2	0.05-0.10	0.0-2.9	1.0-3.0	.10	.32			
	12-22	---	---	---	---	---	---	---	---			
73:												
Yumtheska-----------	0-2	7-27	1.25-1.50	0.6-2	0.05-0.10	0.0-2.9	1.0-3.0	.10	.32	1	8	0
	2-12	7-27	1.25-1.50	0.6-2	0.05-0.10	0.0-2.9	1.0-3.0	.10	.32			
	12-22	---	---	---	---	---	---	---	---			

Table 14.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
1:							
Badland	---	---	---	---	---	---	---
2:							
Barx	0-5	5.0-15	7.4-8.4	0-5	0	0.0-2.0	0
	5-8	15-20	7.4-8.4	0-5	0	0.0-2.0	0
	8-28	10-25	7.4-9.0	5-10	0	0.0-2.0	0
	28-60	15-20	7.9-9.0	15-25	0	0.0-2.0	0
3:							
Barx	0-2	5.0-15	7.4-8.4	0-5	0	0.0-2.0	0
	2-8	15-20	7.4-8.4	0-5	0	0.0-2.0	0
	8-28	10-25	7.4-9.0	5-10	0	0.0-2.0	0
	28-60	15-20	7.9-9.0	15-25	0	0.0-2.0	0
4:							
Begay	0-3	5.0-15	7.4-9.0	0-10	0	0.0-2.0	0
	3-35	5.0-15	7.4-9.0	1-10	0	0.0-2.0	0
	35-55	0.0-5.0	7.4-9.0	1-10	0	0.0-2.0	0
	55-60	5.0-15	7.4-9.0	1-10	0	0.0-2.0	0
5:							
Begay	0-3	5.0-15	7.4-9.0	0-10	0	0.0-2.0	0
	3-35	5.0-15	7.4-9.0	1-10	0	0.0-2.0	0
	35-55	0.0-5.0	7.4-9.0	1-10	0	0.0-2.0	0
	55-60	5.0-15	7.4-9.0	1-10	0	0.0-2.0	0
6:							
Bidonia	0-1	5.0-15	7.4-7.8	0	0	0.0-2.0	0
	1-3	5.0-15	7.4-8.4	0	0	0.0-2.0	0
	3-10	15-40	7.4-8.4	0	0	0.0-2.0	0
	10-14	10-25	7.9-8.4	1-5	0	0.0-2.0	0
	14-24	---	---	---	---	---	---
Bond	0-5	5.0-10	6.6-7.8	0-2	0	0.0-2.0	0
	5-17	10-20	6.6-7.8	0-5	0	0.0-2.0	0
	17-19	10-20	6.6-8.4	5-10	0	0.0-2.0	0
	19-29	---	---	---	---	---	---
Rock Outcrop	---	---	---	---	---	---	---
7:							
Bond	0-5	5.0-10	6.6-7.8	0-2	0	0.0-2.0	0
	5-17	10-20	6.6-7.8	0-5	0	0.0-2.0	0
	17-19	10-20	6.6-8.4	5-10	0	0.0-2.0	0
	19-29	---	---	---	---	---	---
Bidonia	0-1	5.0-10	7.4-7.8	0	0	0.0-2.0	0
	1-3	5.0-15	7.4-8.4	0	0	0.0-2.0	0
	3-10	15-40	7.4-8.4	0	0	0.0-2.0	0
	10-14	10-25	7.9-8.4	1-5	0	0.0-2.0	0
	14-24	---	---	---	---	---	---

Table 14.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
8:							
Brinkerhoff----------	0-4	2.0-10	7.4-8.4	0-5	0	0.0-2.0	0
	4-17	2.0-10	7.4-8.4	0-5	0	0.0-2.0	0
	17-28	0.0-10	7.9-8.4	15-25	0-2	0.0-2.0	0
	28-60	0.0-5.0	7.9-8.4	10-20	1-5	0.0-2.0	0
Grieta---------------	0-3	2.0-10	7.4-8.4	0-5	---	0.0-2.0	---
	3-25	2.0-20	7.4-8.4	0-10	---	0.0-2.0	---
	25-60	2.0-20	7.9-8.4	15-25	---	0.0-2.0	---
9:							
Campanile------------	0-60	20-40	7.4-9.0	2-5	0	0.0-2.0	0
10:							
Clayhole-------------	0-2	2.0-10	7.4-8.4	1-5	5-10	0.0-2.0	0
	2-60	2.0-10	7.4-8.4	5-10	20-35	0.0-2.0	0
11:							
Curhollow------------	0-2	5.0-15	7.4-8.4	1-10	0	0.0-2.0	0
	2-12	5.0-15	7.4-8.4	5-20	0	0.0-2.0	0
	12-22	---	---	---	---	---	---
	22-32	---	---	---	---	---	---
Prieta---------------	0-2	5.0-15	7.4-8.4	0	0	0.0-2.0	0
	2-6	10-30	7.4-8.4	0	0	0.0-2.0	0
	6-16	20-40	7.4-8.4	0-2	0	0.0-2.0	0
	16-26	---	---	---	---	---	---
12:							
Godding--------------	0-5	5.0-20	6.6-7.3	0	0	0.0-2.0	0
	5-12	10-30	6.6-7.8	0	0	0.0-2.0	0
	12-41	20-45	7.4-7.8	0	0	0.0-2.0	0
	41-60	10-30	7.4-7.8	0	0	0.0-2.0	0
13:							
Grieta---------------	0-3	2.0-10	7.4-8.4	0-5	---	0.0-2.0	---
	3-25	2.0-20	7.4-8.4	0-10	---	0.0-2.0	---
	25-60	2.0-20	7.9-8.4	15-25	---	0.0-2.0	---
14:							
Grieta---------------	0-3	2.0-20	7.4-8.4	0-5	---	0.0-2.0	---
	3-25	2.0-20	7.4-8.4	0-10	---	0.0-2.0	---
	25-60	2.0-20	7.9-8.4	15-25	---	0.0-2.0	---
15:							
Gypsids--------------	0-2	---	7.9-8.4	5-10	30-60	0.0-2.0	---
	2-13	---	7.9-8.4	5-10	35-65	0.0-2.0	---
	13-31	---	7.9-8.4	5-10	30-60	0.0-2.0	---
	31-60	---	7.9-8.4	5-10	30-60	0.0-2.0	---
Gypsids, Shallow-----	0-1	---	7.9-8.4	5-10	35-65	0.0-2.0	---
	1-7	---	7.9-8.4	5-10	35-65	0.0-2.0	---
	7-20	---	---	---	---	---	---

Table 14.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
16:							
Hatknoll-------------	0-3	10-25	7.9-8.4	0-5	0	0.0-2.0	0
	3-20	15-35	7.9-8.4	0-5	0	0.0-2.0	0
	20-25	15-35	7.9-8.4	0-5	0	0.0-2.0	0
	25-60	2.0-10	7.9-8.4	15-25	0	0.0-2.0	0
Kinan----------------	0-7	2.0-10	7.9-8.4	1-5	0	0.0-2.0	0
	7-14	2.0-10	7.9-8.4	1-15	0	0.0-2.0	0
	14-44	2.0-10	7.9-8.4	15-30	0	0.0-2.0	0
	44-60	2.0-15	7.9-8.4	1-15	0-5	0.0-2.0	0
17:							
Havasupai------------	0-2	5.0-20	7.4-7.8	10-15	0	0.0-2.0	0
	2-9	5.0-20	7.4-8.4	10-15	0	0.0-2.0	0
	9-17	10-20	7.4-8.4	15-35	0	0.0-2.0	0
	17-35	---	---	0	0	0.0-2.0	0
	35-60	5.0-10	7.4-8.4	20-40	0	0.0-2.0	0
Mellenthin-----------	0-8	5.0-15	7.4-8.4	10-25	0	0.0-2.0	0
	8-15	5.0-15	7.9-8.4	15-35	0	0.0-2.0	0
	15-25	---	---	---	---	---	---
18:							
Jocity---------------	0-4	1.0-10	7.4-8.4	2-5	0	2.0-4.0	13-30
	4-60	2.0-15	7.4-8.4	5-10	0	2.0-4.0	13-30
19:							
Jocity---------------	0-4	10-20	7.4-8.4	2-5	0	0.0-2.0	0
	4-60	2.0-20	7.4-8.4	2-5	0	0.0-2.0	0
Clayhole-------------	0-2	10-25	7.4-8.4	1-5	5-10	0.0-2.0	0
	2-60	2.0-10	7.4-8.4	5-10	20-35	0.0-2.0	0
20:							
Jocity---------------	0-4	10-25	7.4-7.8	2-5	0	0.0-2.0	0
	4-11	15-35	7.4-7.8	2-5	0	0.0-2.0	0
	11-15	5.0-15	7.4-8.4	2-5	0	0.0-2.0	0
	15-33	10-25	7.9-8.4	2-5	0	0.0-2.0	0
	33-60	5.0-15	7.9-8.4	2-5	0	0.0-2.0	0
21:							
Jocity---------------	0-4	10-20	7.4-8.4	1-5	0	0.0-2.0	0
	4-60	2.0-20	7.9-8.4	2-15	0	0.0-2.0	0
22:							
Kinan----------------	0-7	2.0-10	7.4-8.4	1-5	0	0.0-2.0	0
	7-14	2.0-10	7.9-8.4	5-15	0	0.0-2.0	0
	14-44	2.0-10	7.9-8.4	15-30	0	0.0-2.0	0
	44-60	2.0-15	7.4-8.4	1-15	0-5	0.0-2.0	0
23:							
Kinan----------------	0-7	2.0-10	7.4-8.4	1-5	0	0.0-2.0	0
	7-14	2.0-10	7.9-8.4	5-15	0	0.0-2.0	0
	14-44	2.0-10	7.9-8.4	15-30	0	0.0-2.0	0
	44-60	2.0-15	7.4-8.4	1-15	0-5	0.0-2.0	0

Table 14.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
23:							
Hatknoll-------------	0-3	10-25	7.9-8.4	0-5	0	0.0-2.0	0
	3-20	15-35	7.9-8.4	0-5	0	0.0-2.0	0
	20-25	15-35	7.9-8.4	0-5	0	0.0-2.0	0
	25-60	2.0-10	7.9-8.4	15-25	0	0.0-2.0	0
Grieta---------------	0-3	2.0-20	7.4-8.4	0-5	---	0.0-2.0	---
	3-25	2.0-20	7.4-8.4	0-10	---	0.0-2.0	---
	25-60	2.0-20	7.9-8.4	15-25	---	0.0-2.0	---
24:							
Kinan----------------	0-7	2.0-10	7.4-8.4	1-5	0	0.0-2.0	0
	7-14	2.0-10	7.9-8.4	5-15	0	0.0-2.0	0
	14-44	2.0-10	7.9-8.4	15-30	0	0.0-2.0	0
	44-60	2.0-15	7.4-8.4	1-15	0-5	0.0-2.0	0
Pennell--------------	0-2	5.0-15	7.4-8.4	5-10	0	0.0-2.0	0
	2-9	5.0-10	7.9-8.4	5-15	0	0.0-2.0	0
	9-12	5.0-10	7.9-8.4	10-25	0	0.0-2.0	0
	12-22	---	---	---	---	---	---
25:							
Klondike-------------	0-2	10-25	7.4-8.4	2-10	0-5	0.0-2.0	0
	2-11	5.0-15	7.4-8.4	5-15	0-5	0.0-2.0	0
	11-21	---	---	---	---	---	---
26:							
Lava Flows-----------	---	---	---	---	---	---	---
27:							
Lozinta--------------	0-10	5.0-15	6.6-8.4	0	0	0.0-2.0	0
	10-24	5.0-15	6.6-8.4	0-10	0	0.0-2.0	0
	24-60	0.0-1.0	6.6-8.4	0-15	0	0.0-2.0	0
28:							
Lozinta--------------	0-10	5.0-15	6.6-8.4	0	0	0.0-2.0	0
	10-24	5.0-15	6.6-8.4	0-10	0	0.0-2.0	0
	24-60	0.0-1.0	6.6-8.4	0-15	0	0.0-2.0	0
29:							
Manikan--------------	0-4	10-25	7.4-8.4	5-15	0-5	0.0-2.0	0
	4-60	5.0-15	7.4-8.4	5-15	0-5	0.0-2.0	0
30:							
Mellenthin-----------	0-8	5.0-10	7.9-8.4	10-25	0	0.0-2.0	0
	8-15	5.0-10	7.9-8.4	15-35	0	0.0-2.0	0
	15-25	---	---	---	---	---	---
Anasazi--------------	0-12	5.0-15	7.4-8.4	5-15	0	0.0-2.0	0
	12-23	5.0-15	7.9-9.0	15-35	0	0.0-2.0	0
	23-33	---	---	---	---	---	---
31:							
Mellenthin-----------	0-8	2.0-10	7.4-8.4	10-25	0	0.0-2.0	0
	8-15	5.0-10	7.9-8.4	15-35	0	0.0-2.0	0
	15-25	---	---	---	---	---	---

Table 14.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
31:							
Barx-----------------	0-2	5.0-15	7.4-8.4	0-5	0	0.0-2.0	0
	2-8	15-20	7.4-8.4	0-5	0	0.0-2.0	0
	8-28	10-25	7.4-9.0	5-10	0	0.0-2.0	0
	28-60	15-20	7.9-9.0	15-25	0	0.0-2.0	0
32:							
Mellenthin-----------	0-8	2.0-10	7.4-8.4	10-25	0	0.0-2.0	0
	8-15	5.0-10	7.9-8.4	15-35	0	0.0-2.0	0
	15-25	---	---	---	---	---	---
Progresso------------	0-4	5.0-15	6.6-7.8	0-5	0	0.0-2.0	0
	4-27	10-25	6.6-8.4	10-25	0	0.0-2.0	0
	27-37	---	---	---	---	---	---
33:							
Mellenthin-----------	0-8	5.0-15	7.4-8.4	10-25	0	0.0-2.0	0
	8-15	5.0-15	7.9-8.4	15-35	0	0.0-2.0	0
	15-25	---	---	---	---	---	---
34:							
Mellenthin-----------	0-8	5.0-15	7.4-8.4	10-25	0	0.0-2.0	0
	8-15	5.0-15	7.9-8.4	15-35	0	0.0-2.0	0
	15-25	---	---	---	---	---	---
35:							
Mellenthin-----------	0-8	5.0-15	7.4-8.4	10-25	0	0.0-2.0	0
	8-15	5.0-15	7.9-8.4	15-35	0	0.0-2.0	0
	15-25	---	---	---	---	---	---
36:							
Mellenthin-----------	0-8	5.0-15	7.4-8.4	10-25	0	0.0-2.0	0
	8-15	5.0-15	7.9-8.4	15-35	0	0.0-2.0	0
	15-25	---	---	---	---	---	---
37:							
Mido-----------------	0-2	1.0-5.0	7.4-7.8	0-2	0	0.0-2.0	0
	2-60	1.0-5.0	7.4-8.4	2-10	0	0.0-2.0	0
38:							
Mido-----------------	0-2	1.0-5.0	7.4-7.8	0-2	0	0.0-2.0	0
	2-60	1.0-5.0	7.4-8.4	2-10	0	0.0-2.0	0
39:							
Milok----------------	0-3	10-25	7.9-8.4	2-10	0	0.0-2.0	0
	3-11	10-15	7.9-8.4	5-10	0	0.0-2.0	0
	11-30	10-15	7.9-9.0	15-40	0	0.0-2.0	0
	30-60	10-15	7.9-9.0	2-10	0	0.0-2.0	0
40:							
Moab-----------------	0-2	5.0-15	7.4-8.4	5-10	0	0.0-2.0	0
	2-11	5.0-15	7.4-8.4	5-20	0	0.0-2.0	0
	11-38	5.0-15	7.4-8.4	40-60	0	0.0-2.0	0
	38-60	5.0-15	7.4-8.4	25-60	0	0.0-2.0	0

Table 14.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
41:							
Moab----------------	0-2	5.0-20	7.4-8.4	5-15	0	0.0-2.0	0
	2-11	5.0-15	7.4-8.4	5-20	0	0.0-2.0	0
	11-38	5.0-15	7.4-8.4	40-60	0	0.0-2.0	0
	38-60	5.0-15	7.4-8.4	25-60	0	0.0-2.0	0
Mellenthin----------	0-8	5.0-15	7.4-8.4	10-25	0	0.0-2.0	0
	8-15	5.0-15	7.9-8.4	10-25	0	0.0-2.0	0
	15-25	---	---	---	---	---	---
42:							
Monue---------------	0-5	2.0-10	7.4-8.4	1-5	0	0.0-2.0	0
	5-40	2.0-10	7.9-8.4	1-5	0	0.0-2.0	0
	40-46	10-20	8.5-9.9	3-10	0	0.0-2.0	0
	46-60	2.0-10	7.9-8.4	3-10	0	0.0-2.0	0
43:							
Padilla-------------	0-2	20-40	7.4-8.4	0	0	0.0-2.0	0
	2-60	20-40	7.4-8.4	0-5	0	0.0-2.0	0
Penistaja-----------	0-5	2.0-10	7.4-8.4	0-5	0	0.0-2.0	0
	5-19	10-20	7.4-8.4	0-5	0	0.0-2.0	0
	19-42	2.0-10	7.4-8.4	5-15	0	0.0-2.0	0
	42-60	15-25	7.4-8.4	5-15	0	0.0-2.0	0
Campanile-----------	0-60	20-40	7.4-9.0	2-5	0	0.0-2.0	0
44:							
Palma---------------	0-8	5.0-10	6.6-8.4	0	0	0.0-2.0	0
	8-33	5.0-15	7.4-8.4	0	0	0.0-2.0	0
	33-60	5.0-10	7.4-8.4	5-10	0	0.0-2.0	0
45:							
Penistaja-----------	0-5	2.0-10	7.4-8.4	0-5	0	0.0-2.0	0
	5-19	10-20	7.4-8.4	0-5	0	0.0-2.0	0
	19-42	2.0-10	7.4-8.4	5-15	0	0.0-2.0	0
	42-60	15-25	7.4-8.4	5-15	0	0.0-2.0	0
46:							
Pennell-------------	0-2	5.0-10	7.4-8.4	5-10	0	0.0-2.0	0
	2-9	5.0-10	7.9-8.4	10-15	0	0.0-2.0	0
	9-12	5.0-10	7.9-8.4	15-25	0	0.0-2.0	0
	12-22	---	---	---	---	---	---
Bacobi--------------	0-2	5.0-10	7.4-7.8	0	0	0.0-2.0	0-2
	2-13	10-20	7.9-8.4	5-10	0	0.0-2.0	0-13
	13-28	10-20	8.5-9.0	15-30	0	0.0-2.0	0-13
	28-32	5.0-10	8.5-9.0	15-30	0	0.0-2.0	0-13
	32-42	---	---	---	---	---	---
47:							
Pennell-------------	0-2	5.0-15	7.4-8.4	5-10	0	0.0-2.0	0
	2-9	5.0-10	7.9-8.4	10-15	0	0.0-2.0	0
	9-12	5.0-10	7.9-8.4	15-25	0	0.0-2.0	0
	12-22	---	---	---	---	---	---

Table 14.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
48:							
Poley----------------	0-2	10-30	6.6-7.8	0-2	0	0.0-2.0	0
	2-18	10-40	7.4-8.4	0-10	0	0.0-2.0	0
	18-36	5.0-30	7.9-8.4	15-30	0	0.0-2.0	0
	36-49	10-30	7.9-8.4	15-30	0	0.0-2.0	0
	49-60	5.0-15	7.9-8.4	5-15	0	0.0-2.0	0
49:							
Poley----------------	0-2	5.0-20	6.6-7.8	0-2	0	0.0-2.0	0
	2-18	10-40	7.4-8.4	0-10	0	0.0-2.0	0
	18-36	5.0-30	7.9-8.4	15-30	0	0.0-2.0	0
	36-49	10-30	7.9-8.4	15-30	0	0.0-2.0	0
	49-60	5.0-15	7.9-8.4	5-15	0	0.0-2.0	0
Moab-----------------	0-2	5.0-20	7.4-8.4	5-15	0	0.0-2.0	0
	2-11	5.0-15	7.4-8.4	5-20	0	0.0-2.0	0
	11-38	5.0-15	7.4-8.4	40-60	0	0.0-2.0	0
	38-60	5.0-15	7.4-8.4	25-60	0	0.0-2.0	0
50:							
Radnik---------------	0-4	5.0-15	7.4-8.4	0-5	0	0.0-2.0	0
	4-60	5.0-15	7.4-8.4	2-5	0	0.0-2.0	0
51:							
Riverwash------------	---	---	---	---	---	---	---
52:							
Royosa---------------	0-2	0.0-10	7.4-8.4	0	0	0.0-2.0	---
	2-60	0.0-15	7.4-8.4	0	0	0.0-2.0	---
53:							
Royosa---------------	0-2	0.0-10	7.4-8.4	0	0	0.0-2.0	---
	2-60	0.0-15	7.4-8.4	0	0	0.0-2.0	---
Tonalea--------------	0-30	0.0-10	7.4-7.8	0	0	0.0-2.0	0
	30-40	---	---	---	---	---	---
54:							
Saido----------------	0-1	2.0-15	7.4-8.4	1-10	2-10	2.0-8.0	0-4
	1-60	2.0-15	7.4-8.4	5-10	35-50	0.0-2.0	0-4
Brinkerhoff----------	0-4	2.0-10	7.4-8.4	0-5	0	0.0-2.0	0
	4-17	2.0-10	7.4-8.4	0-5	0	0.0-2.0	0
	17-28	0.0-10	7.9-8.4	15-25	0-2	0.0-2.0	0
	28-60	0.0-5.0	7.9-8.4	10-20	1-5	0.0-2.0	0
55:							
Sheppard-------------	0-2	0.0-5.0	7.4-8.4	0-5	0	0	0
	2-60	0.0-10	7.4-9.0	0-10	0	0.0-2.0	0
56:							
Sheppard-------------	0-2	0.0-5.0	7.4-8.4	0-5	0	0	0
	2-60	0.0-10	7.4-9.0	0-10	0	0.0-2.0	0

Table 14.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
57:							
Showlow-------------	0-3	15-25	7.4-7.8	2-5	0	0.0-2.0	0
	3-42	15-40	7.9-8.4	2-15	0	0.0-2.0	0
	42-52	10-25	7.9-8.4	10-25	0	0.0-2.0	0
	52-60	5.0-20	7.9-9.0	10-25	0	0.0-2.0	0
Section-------------	0-2	5.0-20	7.4-7.8	2-5	0	0	0
	2-6	5.0-20	7.4-8.4	15-25	0	0	0
	6-60	5.0-20	7.4-8.4	5-20	0	0	0
58:							
Showlow-------------	0-3	10-30	7.4-7.8	0-1	0	0.0-2.0	0
	3-42	20-40	7.4-7.8	2-15	0	0.0-2.0	0
	42-52	10-30	7.9-8.4	10-25	0	0.0-2.0	0
	52-60	5.0-20	7.9-9.0	10-25	0	0.0-2.0	0
Thimble-------------	0-1	10-30	7.4-7.8	0-5	0	0.0-2.0	0
	1-13	20-40	7.4-7.8	1-10	0	0.0-2.0	0
	13-19	10-30	7.4-7.8	1-10	0	0.0-2.0	0
	19-29	---	---	---	---	---	---
59:							
Showlow-------------	0-3	15-25	7.4-7.8	2-5	0	0.0-2.0	0
	3-42	15-40	7.9-8.4	2-15	0	0.0-2.0	0
	42-52	10-25	7.9-8.4	10-25	0	0.0-2.0	0
	52-60	5.0-20	7.9-9.0	10-25	0	0.0-2.0	0
60:							
Showlow-------------	0-3	15-25	7.4-7.8	2-5	0	0.0-2.0	0
	3-42	15-40	7.9-8.4	2-15	0	0.0-2.0	0
	42-52	10-25	7.9-8.4	10-25	0	0.0-2.0	0
	52-60	5.0-20	7.9-9.0	10-25	0	0.0-2.0	0
61:							
Sponiker------------	0-4	5.0-20	7.4-7.8	0	0	0.0-2.0	0
	4-12	15-30	7.4-7.8	0	0	0.0-2.0	0
	12-22	15-30	7.4-7.8	0	0	0.0-2.0	0
	22-60	20-45	7.4-7.8	0	0	0.0-2.0	0
62:							
Sponiker------------	0-4	5.0-20	7.4-7.8	0	0	0.0-2.0	0
	4-12	15-30	7.4-7.8	0	0	0.0-2.0	0
	12-22	15-30	7.4-7.8	0	0	0.0-2.0	0
	22-60	20-45	7.4-7.8	0	0	0.0-2.0	0
63:							
Torriorthents--------	0-60	---	---	---	---	---	---
Rock Outcrop---------	---	---	---	---	---	---	---
64:							
Torriorthents--------	0-6	---	---	---	---	---	---
Rock Outcrop---------	---	---	---	---	---	---	---

Table 14.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
65:							
Torriorthents--------	0-60	---	---	---	---	---	---
Rock Outcrop---------	---	---	---	---	---	---	---
Torriorthents--------	---	---	---	---	---	---	---
66:							
Whiskey--------------	0-5	5.0-20	6.6-8.4	0-2	0	0.0-2.0	0
	5-60	5.0-20	6.6-8.4	0-10	0	0.0-2.0	0
67:							
Wukoki---------------	0-10	5.0-20	7.4-8.4	0-5	0	0.0-2.0	0
	10-60	0.0-1.0	7.4-8.4	0-5	0	0.0-2.0	0
Lomaki---------------	0-30	5.0-20	7.4-8.4	0-5	0	0.0-2.0	0
	30-60	0.0-1.0	7.9-8.4	0-5	0	0.0-2.0	0
68:							
Wutoma---------------	0-12	5.0-15	6.6-8.4	0-5	0	0.0-2.0	0
	12-60	0.0-1.0	7.4-8.4	0-1	---	0.0-2.0	---
Lozinta--------------	0-10	5.0-15	6.6-8.4	0	0	0.0-2.0	0
	10-24	5.0-15	6.6-8.4	0-10	0	0.0-2.0	0
	24-60	0.0-1.0	6.6-8.4	0-15	0	0.0-2.0	0
69:							
Wutoma---------------	0-12	5.0-15	6.6-8.4	0-5	0	0.0-2.0	0
	12-60	0.0-1.0	7.4-8.4	0-1	---	0.0-2.0	---
Lozinta--------------	0-10	5.0-15	6.6-8.4	0	0	0.0-2.0	0
	10-24	5.0-15	6.6-8.4	0-10	0	0.0-2.0	0
	24-60	0.0-1.0	6.6-8.4	0-15	0	0.0-2.0	0
70:							
Wutoma---------------	0-12	5.0-15	6.6-8.4	0-5	0	0.0-2.0	0
	12-60	0.0-1.0	7.4-8.4	0-1	---	0.0-2.0	---
Rock Outcrop---------	---	---	---	---	---	---	---
71:							
Yumtheska------------	0-2	5.0-20	7.4-8.4	5-10	0	0.0-2.0	0
	2-12	5.0-20	7.4-8.4	15-35	0	0.0-2.0	0
	12-22	---	---	---	---	---	---
Goesling-------------	0-8	5.0-20	6.6-7.8	0-5	---	0.0-2.0	---
	8-24	5.0-25	6.6-8.4	0-10	---	0.0-2.0	---
	24-60	5.0-25	7.4-8.4	15-25	---	0.0-2.0	---
72:							
Yumtheska------------	0-2	5.0-20	7.4-8.4	5-10	0	0.0-2.0	0
	2-12	5.0-20	7.4-8.4	15-35	0	0.0-2.0	0
	12-22	---	---	---	---	---	---
73:							
Yumtheska------------	0-2	5.0-20	7.4-8.4	5-10	0	0.0-2.0	0
	2-12	5.0-20	7.4-8.4	15-35	0	0.0-2.0	0
	12-22	---	---	---	---	---	---

Table 15.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Initial	Total		Uncoated steel	Concrete
		In	In	In	In			
1:								
Badland	---	---	---	---	---	---	---	---
2:								
Barx	---	---	---	0	---	Moderate	High	Low
3:								
Barx	---	---	---	0	---	Moderate	High	Low
4:								
Begay	---	---	---	0	---	Low	High	Low
5:								
Begay	---	---	---	0	---	Low	High	Low
6:								
Bidonia	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
Bond	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
Rock Outcrop	---	---	---	---	---	---	---	---
7:								
Bond	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
Bidonia	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
8:								
Brinkerhoff	---	---	---	0	---	Moderate	High	Moderate
Grieta	---	---	---	0	---	Low	High	Low
9:								
Campanile	---	---	---	0	---	Low	High	Low
10:								
Clayhole	---	---	---	0	---	Low	High	High
11:								
Curhollow	Undefined	10-20	4-17	0	---	Low	High	Low
	Bedrock (lithic)	16-36	---					
Prieta	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
12:								
Godding	---	---	---	0	---	Low	High	Low
13:								
Grieta	---	---	---	0	---	Low	High	Low
14:								
Grieta	---	---	---	0	---	Low	High	Low

Table 15.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Initial	Total		Uncoated steel	Concrete
		In	In	In	In			
15:								
Gypsids	---	60-99	---	2-10	10-36	Moderate	High	High
Gypsids, Shallow	Bedrock (paralithic)	4-20	---	0	---	Low	High	High
16:								
Hatknoll	---	---	---	0	---	Low	High	Low
Kinan	---	---	---	0	---	Low	High	Low
17:								
Havasupai	Undefined	10-20	4-17	0	---	Moderate	High	Low
Mellenthin	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
18:								
Jocity	---	---	---	0	---	Low	High	Low
19:								
Jocity	---	---	---	0	---	Low	High	Low
Clayhole	---	---	---	0	---	Low	High	High
20:								
Jocity	---	---	---	0	---	Low	High	Low
21:								
Jocity	---	---	---	0	---	Low	High	Low
22:								
Kinan	---	---	---	0	---	Low	High	Low
23:								
Kinan	---	---	---	0	---	Low	High	Low
Hatknoll	---	---	---	0	---	Low	High	Low
Grieta	---	---	---	0	---	Low	High	Low
24:								
Kinan	---	---	---	0	---	Low	High	Low
Pennell	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
25:								
Klondike	Bedrock (paralithic)	10-20	---	0	---	Low	High	Low
26:								
Lava Flows	---	---	---	---	---	---	---	---
27:								
Lozinta	---	---	---	0	---	Low	High	Low
28:								
Lozinta	---	---	---	0	---	Low	High	Low

Table 15.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In	In	In			
29:								
Manikan	---	---	---	0	---	Moderate	High	Low
30:								
Mellenthin	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
Anasazi	Bedrock (lithic)	20-40	---	0	---	Moderate	High	Low
31:								
Mellenthin	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
Barx	---	---	---	0	---	Low	High	Low
32:								
Mellenthin	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
Progresso	Bedrock (lithic)	20-40	---	0	---	Low	High	Low
33:								
Mellenthin	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
34:								
Mellenthin	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
35:								
Mellenthin	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
36:								
Mellenthin	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
37:								
Mido	---	---	---	0	---	Low	High	Low
38:								
Mido	---	---	---	0	---	Low	High	Low
39:								
Milok	---	---	---	0	---	Low	High	Low
40:								
Moab	---	---	---	0	---	Low	High	Low
41:								
Moab	---	---	---	0	---	Moderate	High	Low
Mellenthin	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
42:								
Monue	---	---	---	0	---	Low	High	Low
43:								
Padilla	---	---	---	0	---	Low	High	Low
Penistaja	---	---	---	0	---	Low	High	Low
Campanile	---	---	---	0	---	Low	High	Low

Table 15.--Soil Features--Continued

Map symbol and soil name	Restrictive layer Kind	Depth to top	Thickness	Subsidence Initial	Total	Potential for frost action	Risk of corrosion Uncoated steel	Concrete
		In	In	In	In			
44:								
Palma	---	---	---	0	---	Low	High	Low
45:								
Penistaja	---	---	---	0	---	Low	High	Low
46:								
Pennell	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
Bacobi	Bedrock (paralithic)	20-40	---	0	---	Low	Low	Low
47:								
Pennell	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
48:								
Poley	---	---	---	0	---	Low	High	Low
49:								
Poley	---	---	---	0	---	Low	High	Low
Moab	---	---	---	0	---	Moderate	High	Low
50:								
Radnik	---	---	---	0	---	Low	High	Low
51:								
Riverwash	---	---	---	---	---	---	---	---
52:								
Royosa	---	---	---	0	---	Low	High	Low
53:								
Royosa	---	---	---	0	---	Low	High	Low
Tonalea	Bedrock (lithic)	20-40	---	0	---	Low	High	Low
54:								
Saido	---	---	---	0	---	Low	High	High
Brinkerhoff	---	---	---	0	---	Moderate	High	Moderate
55:								
Sheppard	---	---	---	0	---	Low	High	Low
56:								
Sheppard	---	---	---	0	---	Low	High	Low
57:								
Showlow	---	---	---	0	---	Low	High	Low
Section	---	---	---	0	---	Low	High	Low
58:								
Showlow	---	60-99	---	0	---	Low	High	Low
Thimble	Bedrock (lithic)	10-20	---	0	---	Low	High	Low
59:								
Showlow	---	---	---	0	---	Low	High	Low

Table 15.--Soil Features--Continued

Map symbol and soil name	Restrictive layer Kind	Restrictive layer Depth to top	Restrictive layer Thickness	Subsidence Initial	Subsidence Total	Potential for frost action	Risk of corrosion Uncoated steel	Risk of corrosion Concrete
		In	In	In	In			
60:								
Showlow	---	---	---	0	---	Low	High	Low
61:								
Sponiker	---	60-99	---	0	---	Low	High	Low
62:								
Sponiker	---	60-99	---	0	---	Low	High	Low
63:								
Torriorthents	Bedrock (lithic)	4-60	---	0	---	Low	---	---
Rock Outcrop	---	---	---	---	---	---	---	---
64:								
Torriorthents	Bedrock (lithic)	4-60	---	0	---	Low	---	---
Rock Outcrop	---	---	---	---	---	---	---	---
65:								
Torriorthents	Bedrock (lithic)	4-60	---	0	---	Low	---	---
Rock Outcrop	---	---	---	---	---	---	---	---
Torriorthents	---	---	---	---	---	---	---	---
66:								
Whiskey	---	60-99	---	0	---	Low	High	Low
67:								
Wukoki	---	---	---	0	---	Low	High	Low
Lomaki	---	---	---	0	---	Low	High	Low
68:								
Wutoma	---	---	---	0	---	Low	High	Low
Lozinta	---	---	---	0	---	Low	High	Low
69:								
Wutoma	---	---	---	0	---	Low	High	Low
Lozinta	---	---	---	0	---	Low	High	Low
70:								
Wutoma	---	---	---	0	---	Low	High	Low
Rock Outcrop	---	---	---	---	---	---	---	---
71:								
Yumtheska	Bedrock (lithic)	7-20	---	0	---	Low	High	Low
Goesling	---	---	---	0	---	Low	High	Low
72:								
Yumtheska	Bedrock (lithic)	7-20	---	0	---	Low	High	Low
73:								
Yumtheska	Bedrock (lithic)	7-20	---	0	---	Low	High	Low

Table 16.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro-logic group	Month	Flooding: Duration	Flooding: Frequency
1:				
Badland	---			
		Jan-Dec	---	None
2:				
Barx	B			
		Jan-Dec	---	None
3:				
Barx	B			
		Jan-Dec	---	None
4:				
Begay	B			
		Jan-Dec	---	None
5:				
Begay	B			
		Jan-Dec	---	None
6:				
Bidonia	D			
		Jan-Dec	---	None
Bond	D			
		Jan-Dec	---	None
Rock Outcrop	---			
		Jan-Dec	---	None
7:				
Bond	D			
		Jan-Dec	---	None
Bidonia	D			
		Jan-Dec	---	None
8:				
Brinkerhoff	D			
		Jan-Dec	---	None
Grieta	B			
		Jan-Dec	---	None
9:				
Campanile	C			
		Jan-Dec	---	None
10:				
Clayhole	B			
		Jan-Dec	---	None

Table 16.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Flooding	
			Duration	Frequency
11:				
Curhollow	C			
		Jan-Dec	---	None
Prieta	D			
		Jan-Dec	---	None
12:				
Godding	C			
		Jan-Dec	---	None
13:				
Grieta	B			
		Jan-Dec	---	None
14:				
Grieta	B			
		Jan-Dec	---	None
15:				
Gypsids	B			
		Jan-Dec	---	None
Gypsids, Shallow	D			
		Jan-Dec	---	None
16:				
Hatknoll	B			
		Jan-Dec	---	None
Kinan	B			
		Jan-Dec	---	None
17:				
Havasupai	C			
		Jan-Dec	---	None
Mellenthin	D			
		Jan-Dec	---	None
18:				
Jocity	B			
		Jan-Dec	---	None
19:				
Jocity	B			
		Jan-Dec	---	None
Clayhole	B			
		Jan-Dec	---	None
20:				
Jocity	C			
		Jan-Dec	---	None

Table 16.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Flooding: Duration	Flooding: Frequency
21:				
Jocity	B			
		July	Very brief	Occasional
		August	Very brief	Occasional
		September	Very brief	Occasional
22:				
Kinan	B			
		Jan-Dec	---	None
23:				
Kinan	B			
		Jan-Dec	---	None
Hatknoll	B			
		Jan-Dec	---	None
Grieta	B			
		Jan-Dec	---	None
24:				
Kinan	B			
		Jan-Dec	---	None
Pennell	B			
		Jan-Dec	---	None
25:				
Klondike	D			
		Jan-Dec	---	None
26:				
Lava Flows	---			
		Jan-Dec	---	None
27:				
Lozinta	B			
		Jan-Dec	---	None
28:				
Lozinta	B			
		Jan-Dec	---	None
29:				
Manikan	B			
		Jan-Dec	---	None
30:				
Mellenthin	D			
		Jan-Dec	---	None
Anasazi	C			
		Jan-Dec	---	None
31:				
Mellenthin	D			
		Jan-Dec	---	None
Barx	B			
		Jan-Dec	---	None

Table 16.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Flooding	
			Duration	Frequency
32:				
Mellenthin	D			
		Jan-Dec	---	None
Progresso	C			
		Jan-Dec	---	None
33:				
Mellenthin	D			
		Jan-Dec	---	None
34:				
Mellenthin	D			
		Jan-Dec	---	None
35:				
Mellenthin	D			
		Jan-Dec	---	None
36:				
Mellenthin	D			
		Jan-Dec	---	None
37:				
Mido	A			
		Jan-Dec	---	None
38:				
Mido	A			
		Jan-Dec	---	None
39:				
Milok	B			
		Jan-Dec	---	None
40:				
Moab	B			
		Jan-Dec	---	None
41:				
Moab	B			
		Jan-Dec	---	None
Mellenthin	D			
		Jan-Dec	---	None
42:				
Monue	B			
		Jan-Dec	---	None
43:				
Padilla	C			
		Jan-Dec	---	None
Penistaja	B			
		Jan-Dec	---	None
Campanile	C			
		Jan-Dec	---	None

Table 16.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Flooding: Duration	Flooding: Frequency
44:				
Palma	B			
		Jan-Dec	---	None
45:				
Penistaja	B			
		Jan-Dec	---	None
46:				
Pennell	B			
		Jan-Dec	---	None
Bacobi	C			
		Jan-Dec	---	None
47:				
Pennell	B			
		Jan-Dec	---	None
48:				
Poley	C			
		Jan-Dec	---	None
49:				
Poley	C			
		Jan-Dec	---	None
Moab	B			
		Jan-Dec	---	None
50:				
Radnik	B			
		Jan-Dec	---	None
51:				
Riverwash	---			
		Jan-Dec	---	None
52:				
Royosa	A			
		Jan-Dec	---	None
53:				
Royosa	A			
		Jan-Dec	---	None
Tonalea	C			
		Jan-Dec	---	None
54:				
Saido	B			
		Jan-Dec	---	None
Brinkerhoff	D			
		Jan-Dec	---	None

Table 16.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Flooding: Duration	Flooding: Frequency
55:				
Sheppard------------------	A			
		Jan-Dec	---	None
56:				
Sheppard------------------	A			
		Jan-Dec	---	None
57:				
Showlow-------------------	D			
		Jan-Dec	---	None
Section-------------------	B			
		Jan-Dec	---	None
58:				
Showlow-------------------	C			
		Jan-Dec	---	None
Thimble-------------------	C			
		Jan-Dec	---	None
59:				
Showlow-------------------	D			
		Jan-Dec	---	None
60:				
Showlow-------------------	D			
		Jan-Dec	---	None
61:				
Sponiker------------------	B			
		Jan-Dec	---	None
62:				
Sponiker------------------	B			
		Jan-Dec	---	None
63:				
Torriorthents-------------	D			
		Jan-Dec	---	None
Rock Outcrop--------------	---			
		Jan-Dec	---	None
64:				
Torriorthents-------------	D			
		Jan-Dec	---	None
Rock Outcrop--------------	---			
		Jan-Dec	---	None
65:				
Torriorthents-------------	D			
		Jan-Dec	---	None
Rock Outcrop--------------	---			
		Jan-Dec	---	None

Table 16.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Flooding: Duration	Flooding: Frequency
65:				
Torriorthents	---			
		Jan-Dec	---	None
66:				
Whiskey	B			
		Jan-Dec	---	None
67:				
Wukoki	B			
		Jan-Dec	---	None
Lomaki	B			
		Jan-Dec	---	None
68:				
Wutoma	B			
		Jan-Dec	---	None
Lozinta	B			
		Jan-Dec	---	None
69:				
Wutoma	B			
		Jan-Dec	---	None
Lozinta	B			
		Jan-Dec	---	None
70:				
Wutoma	B			
		Jan-Dec	---	None
Rock Outcrop	---			
		Jan-Dec	---	None
71:				
Yumtheska	D			
		Jan-Dec	---	None
Goesling	B			
		Jan-Dec	---	None
72:				
Yumtheska	D			
		Jan-Dec	---	None
73:				
Yumtheska	D			
		Jan-Dec	---	None

Table 17.--Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Anasazi	Coarse-loamy, mixed, superactive, mesic Ustic Haplocalcids
Bacobi	Fine-loamy, mixed, superactive, mesic Typic Haplargids
Barx	Fine-loamy, mixed, superactive, mesic Ustic Calciargids
Begay	Coarse-loamy, mixed, superactive, mesic Ustic Haplocambids
Bidonia	Clayey, kaolinitic, mesic Lithic Ustic Haplargids
Bond	Loamy, mixed, superactive, mesic Lithic Ustic Haplargids
Brinkerhoff	Coarse-loamy, mixed, mesic Typic Haplargids
Campanile	Fine, mixed, superactive, mesic Chromic Haplotorrerts
Clayhole	Fine-loamy, mixed, calcareous, mesic Typic Torrifluvents
Curhollow	Loamy-skeletal, mixed, superactive, mesic, shallow Calcic Petrocalcids
Godding	Clayey-skeletal, smectitic, frigid Pachic Argiustolls
Goesling	Fine-loamy, mixed, mesic Aridic Haplustalfs
Grieta	Fine-loamy, mixed, mesic Typic Haplargids
Gypsids	Gypsids
Gypsids, Shallow	Gypsids
Hatknoll	Fine, smectitic, mesic Typic Haplargids
Havasupai	Loamy-skeletal, mixed, superactive, mesic, shallow Calcic Petrocalcids
Jocity	Fine-loamy, mixed, superactive, calcareous, mesic Typic Torrifluvents
Kinan	Coarse-loamy, mixed, superactive, mesic Typic Haplocalcids
Klondike	Loamy, mixed, active, calcareous, mesic, shallow Ustic Torriorthents
Lomaki	Ashy-skeletal over fragmental or cindery, mixed, mesic Vitrandic Haplocambids
Lozinta	Ashy-skeletal over fragmental or cindery, mixed, mesic Vitrandic Haplustepts
Manikan	Fine-loamy, mixed, superactive, calcareous, mesic Ustic Torrifluvents
Mellenthin	Loamy-skeletal, mixed, superactive, mesic Lithic Ustic Haplocalcids
Mido	Mixed, mesic Ustic Torripsamments
Milok	Coarse-loamy, mixed, superactive, mesic Ustic Haplocalcids
Moab	Loamy-skeletal, carbonatic, mesic Ustic Haplocalcids
Monue	Coarse-loamy, mixed, superactive, mesic Typic Haplocambids
Padilla	Fine, mixed, superactive, mesic Ustic Haplargids
Palma	Coarse-loamy, mixed, superactive, mesic Ustic Calciargids
Penistaja	Fine-loamy, mixed, superactive, mesic Ustic Haplargids
Pennell	Loamy, mixed, mesic Lithic Haplocalcids
*Poley	Fine, smectitic, superactive, mesic Ustic Calciargids
Prieta	Clayey-skeletal, mixed, superactive, mesic Lithic Ustic Haplargids
Progresso	Fine-loamy, mixed, superactive, mesic Ustic Calciargids
Radnik	Coarse-loamy, mixed, calcareous, mesic Ustic Torrifluvents
Royosa	Mixed, mesic Aridic Ustipsamments
Saido	Coarse-silty, gypsic, mesic Leptic Haplogypsids
Section	Fine-loamy, mixed, mesic Aridic Calciustolls
Sheppard	Mixed, mesic Typic Torripsamments
Showlow	Fine, smectitic, mesic Aridic Argiustolls
Sponiker	Fine, smectitic, mesic Pachic Argiustolls
Thimble	Clayey-skeletal, smectitic, mesic Lithic Argiustolls
Tonalea	Mixed, mesic Aridic Ustipsamments
Torriorthents	Torriorthents
Torriorthents	Torriorthents
Whiskey	Fine-loamy, mixed, mesic Pachic Haplustolls
Wukoki	Ashy-skeletal over fragmental or cindery, mixed, mesic Vitrandic Haplocambids
Wutoma	Ashy-skeletal over fragmental or cindery, mixed, mesic Vitrandic Haplustepts
Yumtheska	Loamy-skeletal, mixed, superactive, mesic Lithic Calciustolls

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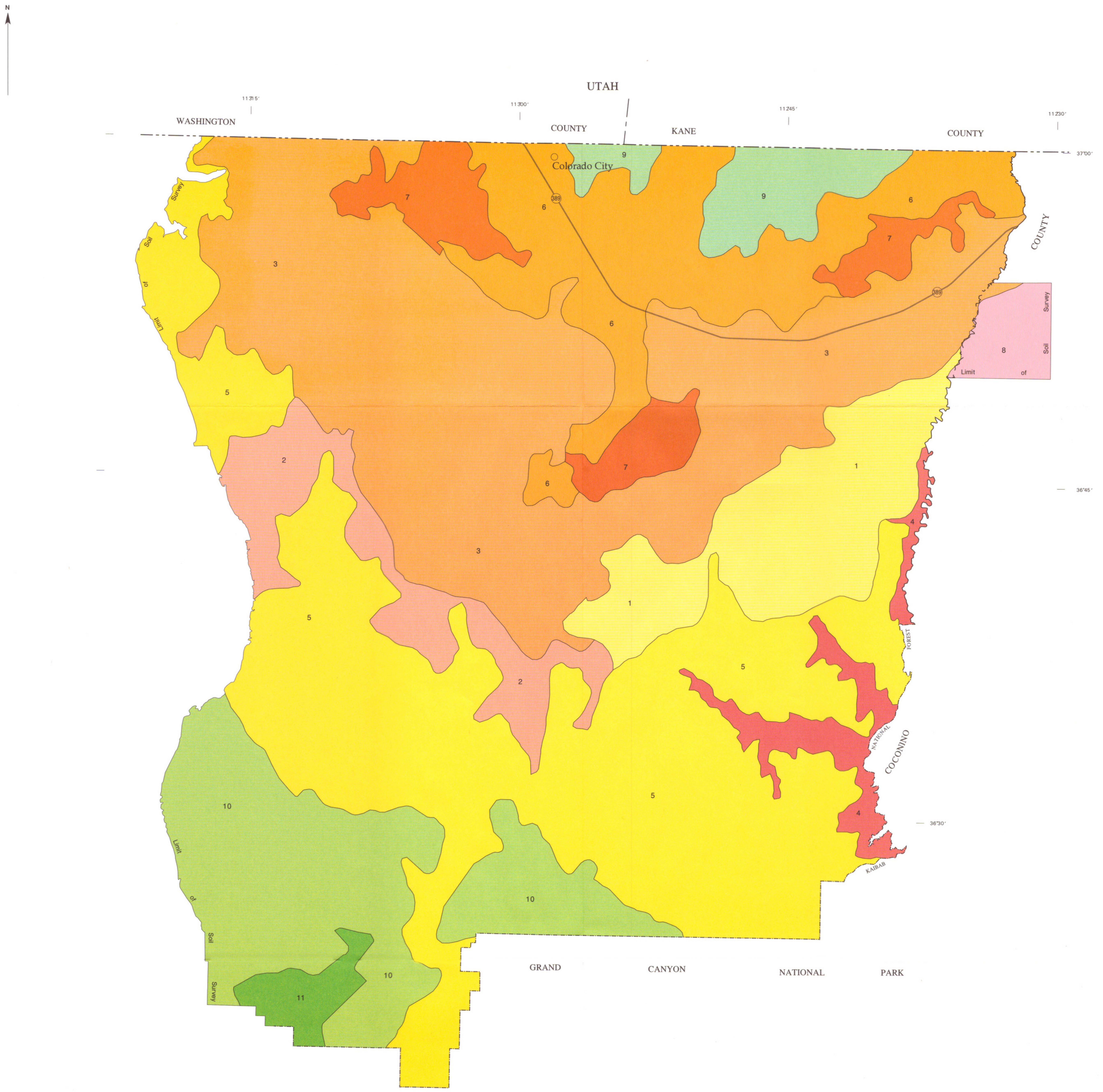


SOIL LEGEND*

Dominantly very shallow to very deep, well drained and somewhat excessively drained, nearly level to very steep soils in the arid climatic zone.

1	Pennell-Bacobi
2	Grieta-Kinan-Hatknoll
3	Clayhole-Gypsiorthids-Jocity
4	Rock outcrop-Torriorthents

Dominantly shallow to very deep, well drained to excessively drained, nearly level to very steep soils, in the semiarid climatic zone.

5	Mellenthin-Moab-Poley
6	Barx-Mido-Begay
7	Bond-Bidonia
8	Mellenthin-Curhollow

Dominantly very shallow to very deep, well drained and somewhat excessively drained, nearly level to steep soils in the dry subhumid and subhumid climatic zone.

9	Royosa-Tonalea
10	Showlow-Yumtheska-Lozinta
11	Sponiker-Godding

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1993

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
BUREAU OF INDIAN AFFAIRS
NATIONAL PARK SERVICE
ARIZONA AGRICULTURAL EXPERIMENT STATION
KAIBAB - PAIUTE TRIBE

GENERAL SOIL MAP

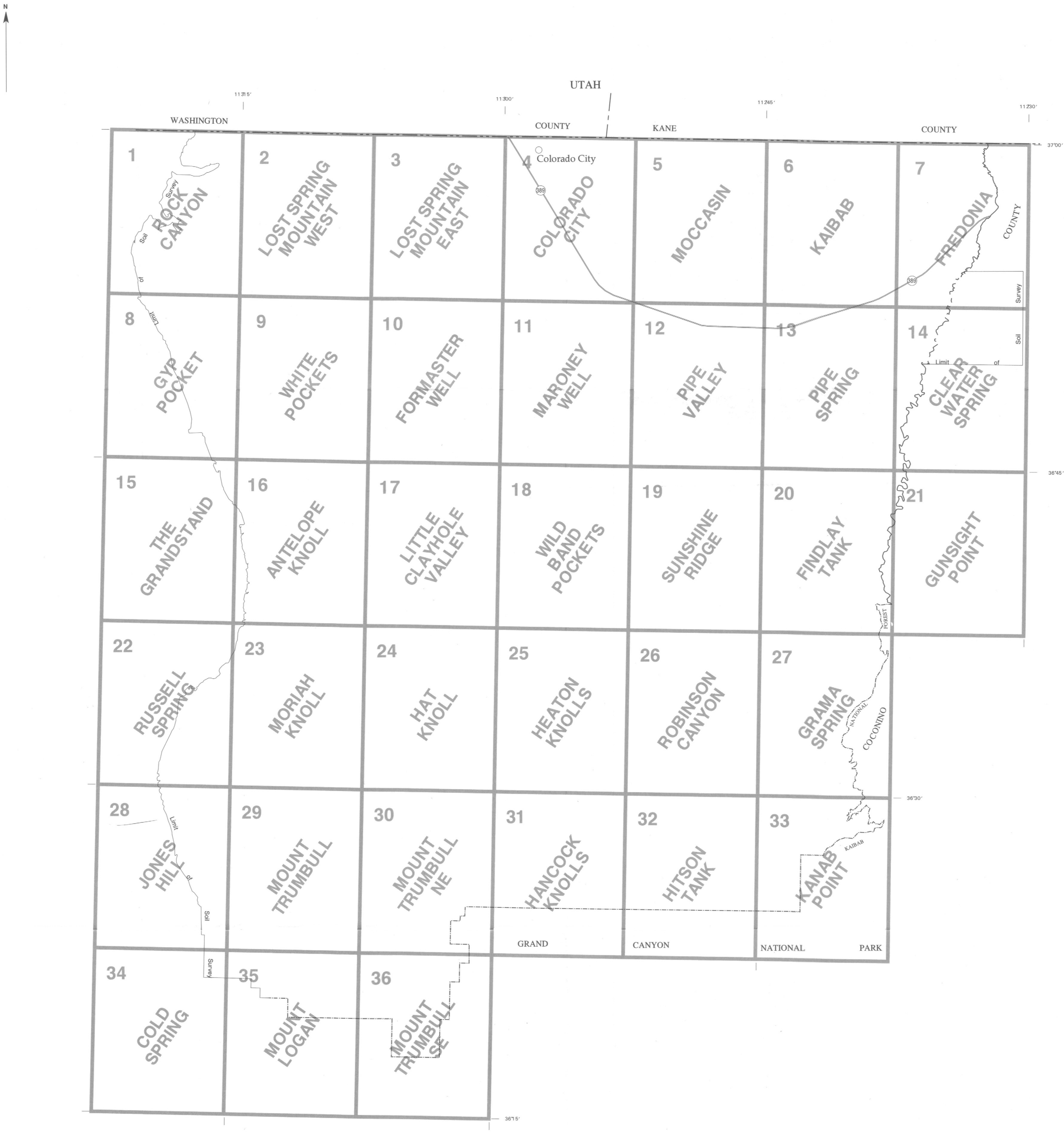
MOHAVE COUNTY AREA, ARIZONA NORTHEASTERN PART, AND PART OF COCONINO COUNTY

Scale 1:200000

MILES

KILOMETERS

Each area outlined on this map consists of more than one kind of soil. The map is meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

MOHAVE COUNTY AREA, ARIZONA
NORTHEASTERN PART, AND PART OF COCONINO COUNTY

Scale 1:200000

MILES

KILOMETERS

SOIL LEGEND

Publication symbols are numerical and assigned according to the alphabetical sequence of the mapping units. There is no significance to the symbols. They are non-connotative.

SYMBOL	NAME
1	Badland
2	Barx fine sandy loam, 1 to 5 percent slopes
3	Barx loam, 1 to 4 percent slopes
4	Begay fine sandy loam, 1 to 3 percent slopes
5	Begay fine sandy loam, 3 to 12 percent slopes
6	Bidonia-Bond-Rock outcrop complex, 1 to 25 percent slopes
7	Bond-Bidonia complex, 1 to 7 percent slopes
8	Brinkerhoff-Grieta complex, 0 to 5 percent slopes
9	Campanile clay, 1 to 6 percent slopes
10	Clayhole loam, 1 to 3 percent slopes
11	Curhollow-Prieta complex, 4 to 20 percent slopes
12	Godding gravelly loam, 3 to 40 percent slopes
13	Grieta fine sandy loam, 1 to 5 percent slopes
14	Grieta loam, 1 to 5 percent slopes
15	Gypsiorthids-Gypsiorthids, shallow complex, 1 to 50 percent slopes
16	Hatknoll-Kinan complex, 1 to 10 percent slopes
17	Havasupai-Mellenthin complex, 2 to 12 percent slopes
18	Jocity loamy find sand, saline-sodic, 1 to 3 percent slopes
19	Jocity Clayhole complex, 1 to 4 percent slopes
20	Jocity silty clay loam, 1 to 4 percent slopes
21	Jocity silty clay loam, 1 to 2 percent slopes, flooded
22	Kinan gravelly loam, 1 to 15 percent slopes
23	Kinan -Hatknoll-Grieta complex, 1 to 5 percent slopes
24	Kinan-Pennell complex, 1 to 20 percent slopes
25	Klondike sandy clay loam, 2 to 15 percent slopes
26	Lava flows
27	Lozinta extremely gravelly loam, 1 to 15 percent slopes
28	Lozinta extremely gravelly loam, 15 to 45 percent slopes
29	Manikan silty clay loam, 1 to 4 percent slopes
30	Mellenthin-Anasazi complex, 1 to 15 percent slopes
31	Mellenthin-Barx complex, 1 to 15 percent slopes
32	Mellenthin-Progresso complex, 1 to 7 percent slopes
33	Mellenthin very gravelly loam, 1 to 25 percent slopes
34	Mellenthin very gravelly loam, 30 to 50 percent slopes
35	Mellenthin very gravelly loam, cool, 1 to 25 percent slopes
36	Mellenthin very gravelly loam, warm, 1 to 25 percent slopes
37	Mido fine sand, 1 to 10 percent slopes
38	Mido loamy fine sand, 1 to 4 percent slopes, gullied
39	Milok gravelly loam, 1 to 15 percent slopes
40	Moab loam, 1 to 5 percent slopes
41	Moab-Mellenthin complex, 1 to 20 percent slopes
42	Monue fine sandy loam, 1 to 5 percent slopes
43	Padilla-Penistaja-Campanile complex, 1 to 6 percent slopes
44	Palma loamy fine sand, 1 to 5 percent slopes
45	Penistaja fine sandy loam, 1 to 5 percent slopes
46	Pennell-Bacobi complex, 1 to 7 percent slopes
47	Pennell gravelly loam, 1 to 12 percent slopes
48	Poley cobbly silty clay loam, 1 to 5 percent slopes
49	Poley-Moab complex, 1 to 10 percent slopes
50	Radnik fine sandy loam, 1 to 5 percent slopes
51	Riverwash
52	Royosa fine sand, 2 to 10 percent slopes
53	Royosa-Tonalea complex, 1 to 15 percent slopes
54	Saido-Brinkerhoff complex, 1 to 5 percent slopes
55	Sheppard fine sand, 1 to 7 percent slopes
56	Sheppard loamy fine sand, 1 to 4 percent slopes, gullied
57	Showlow-Section complex, 1 to 15 percent slopes
58	Showlow-Thimble complex, 1 to 15 percent slopes
59	Showlow very cobbly clay loam, 1 to 15 percent slopes
60	Showlow very cobbly clay loam, 15 to 35 percent slopes
61	Sponiker gravelly loam, 1 to 15 percent slopes
62	Sponiker gravelly loam, 15 to 40 percent slopes
63	Torriorthents-Rock outcrop complex, 30 to 70 percent slopes
64	Torriorthents-Rock outcrop complex, dry, 30 to 70 percent slopes
65	Torriorthents-Rock outcrop complex, warm, 30 to 70 percent slopes
66	Whiskey silt loam, 1 to 4 percent slopes
67	~~Wukoki-Lomaki complex, 15 to 50 percent slopes~~
68	Wutoma-Lozinta complex, 1 to 15 percent slopes
69	Wutoma-Lozinta complex, 15 to 50 percent slopes
70	Wutoma-Rock outcrop complex, 1 to 15 percent slopes
71	Yumtheska-Goesling complex, 1 to 15 percent slopes
72	Yumtheska very gravelly loam, 4 to 20 percent slopes
73	Yumtheska very gravelly loam, 30 to 50 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

National, state, or province

County or parish

Limit of soil survey (label)

Field sheet matchline and neatline

ROAD EMBLEM & DESIGNATIONS

State 52

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS 10 15

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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 12.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

ROCK CANYON & THE DIVIDE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 1 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
FORMASTER WELL QUADRANGLE
SHEET NUMBER 10 OF 36

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1992 aerial photography. Hydrography, culture, and public land survey system (PLSS) information were acquired from U.S. Geological Survey.

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NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

FORMASTER WELL, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
MARONEY WELL QUADRANGLE
SHEET NUMBER 11 OF 36

Joins sheet 3, Lost Spring Mountain East

Joins sheet 4, Colorado City

Joins sheet 5, Moccasin

113°00'00" R. 7 W. R. 6 W. 112°57'30" 112°55'00" R. 6 W. R. 5 W. 112°52'30"

36°52'30" 36°52'30"

36°50'00" 36°50'00"

T. 40 N.
T. 39 N.

Joins sheet 10, Formaster Well

Joins sheet 12, Pipe Valley

36°47'30" 36°47'30"

36°45'00" 36°45'00"

113°00'00" R. 7 W. R. 6 W. 112°57'30" 112°55'00" R. 6 W. R. 5 W. 112°52'30"

Joins sheet 17, Little Clayhole Valley

Joins sheet 18, Wild Band Pockets

Joins sheet 19, Sunshine Ridge

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NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

MARONEY WELL, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 11 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
PIPE VALLEY QUADRANGLE
SHEET NUMBER 12 OF 36

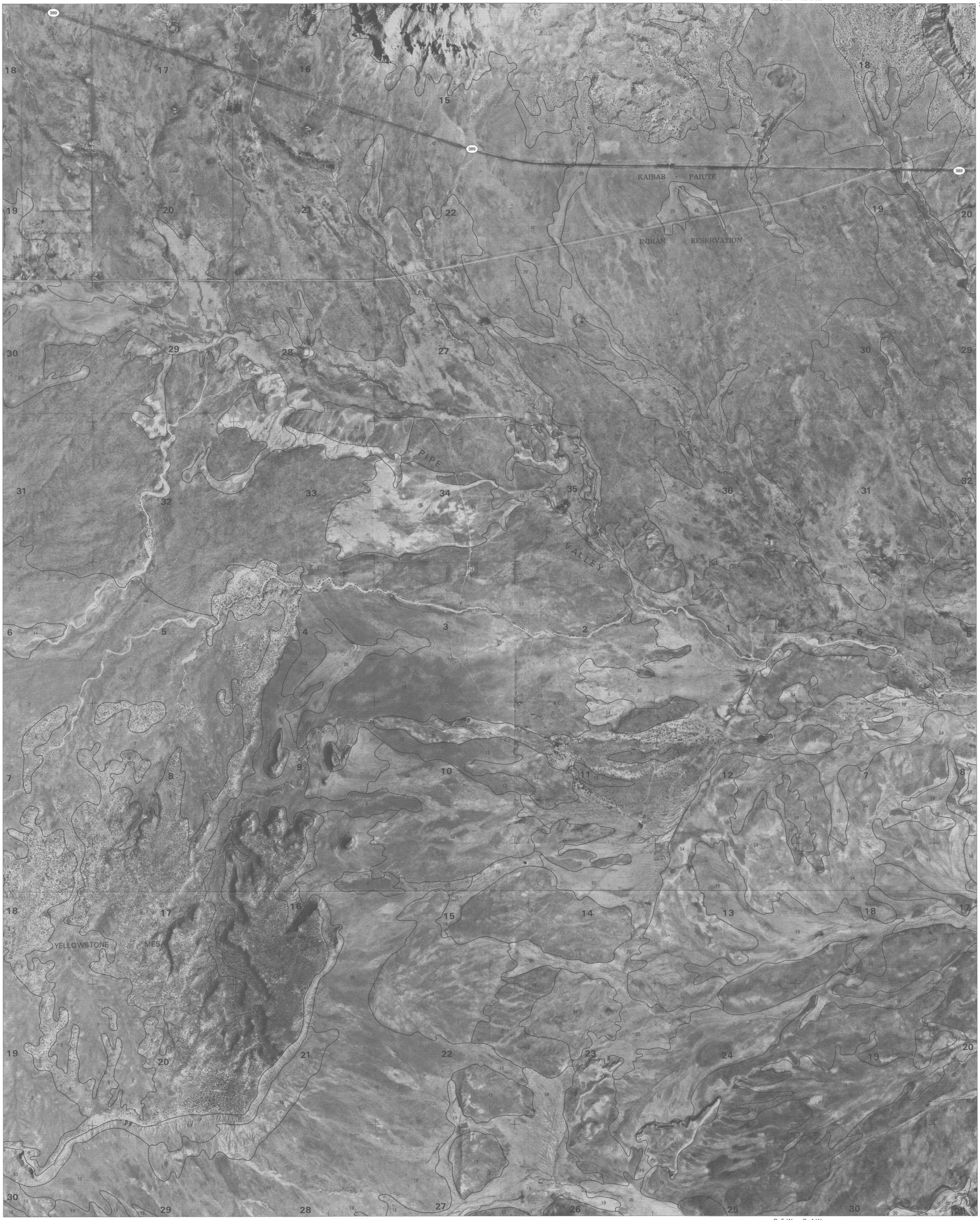
Joins sheet 4, Colorado City

Joins sheet 5, Moccasin

Joins sheet 6, Kaibab

112°52′30″ 112°50′00″ 112°47′30″ R. 5 W. R. 4 W. 112°45′00″

36°52′30″



36°50′00″

T. 40 N.
T. 39 N.

Joins sheet 11, Maroney Well

Joins sheet 13, Pipe Spring

36°47′30″

36°45′00″

112°52′30″ 112°50′00″ 112°47′30″ R. 5 W. R. 4 W. 112°45′00″

Joins sheet 19, Sunshine Ridge

Joins sheet 18, Wild Band Pockets

Joins sheet 20, Findlay Tank

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NORTH

SCALE 1:24000

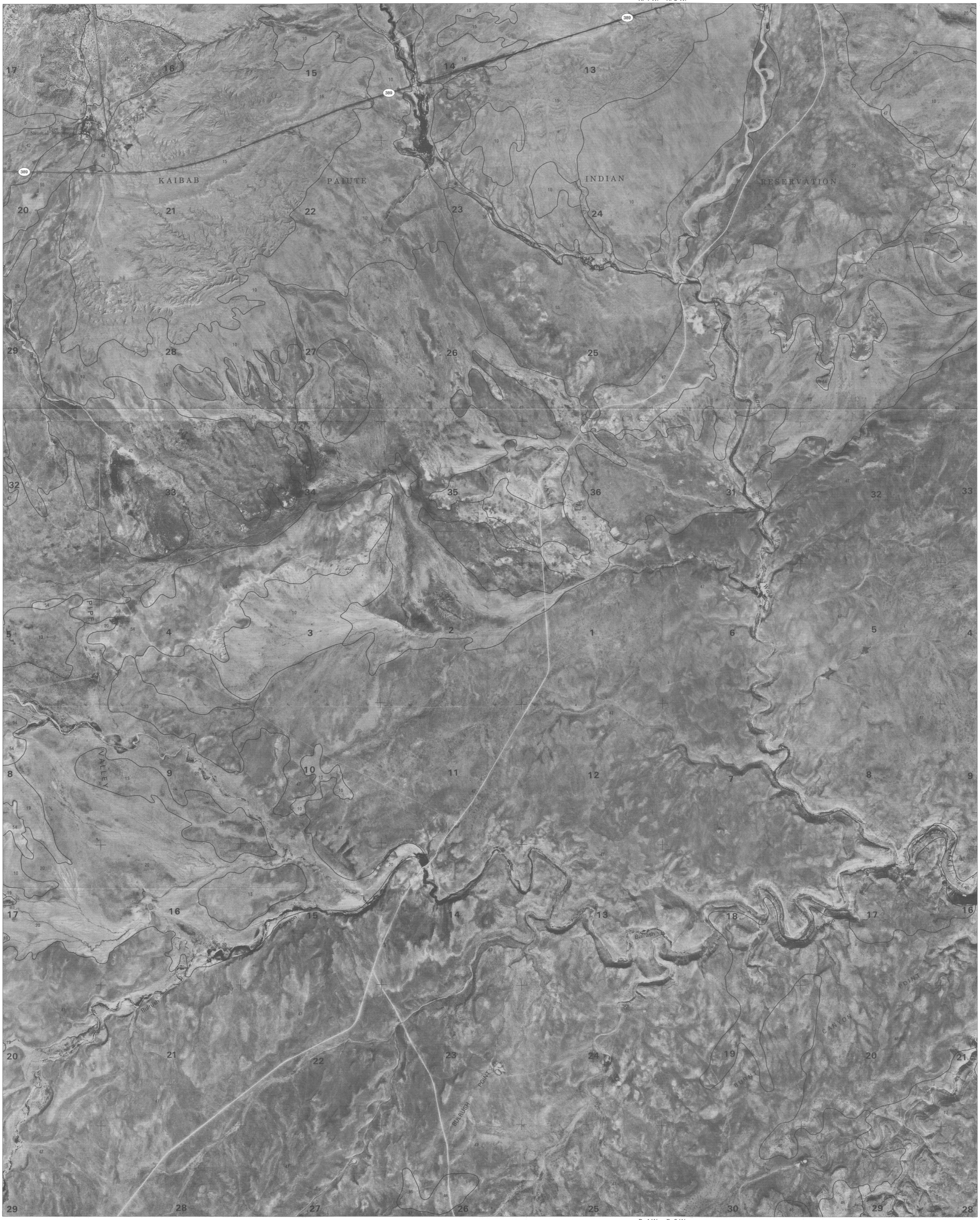
1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

PIPE VALLEY, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 12 OF 36



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NORTH

SCALE 1:24000

1 0 1
MILES

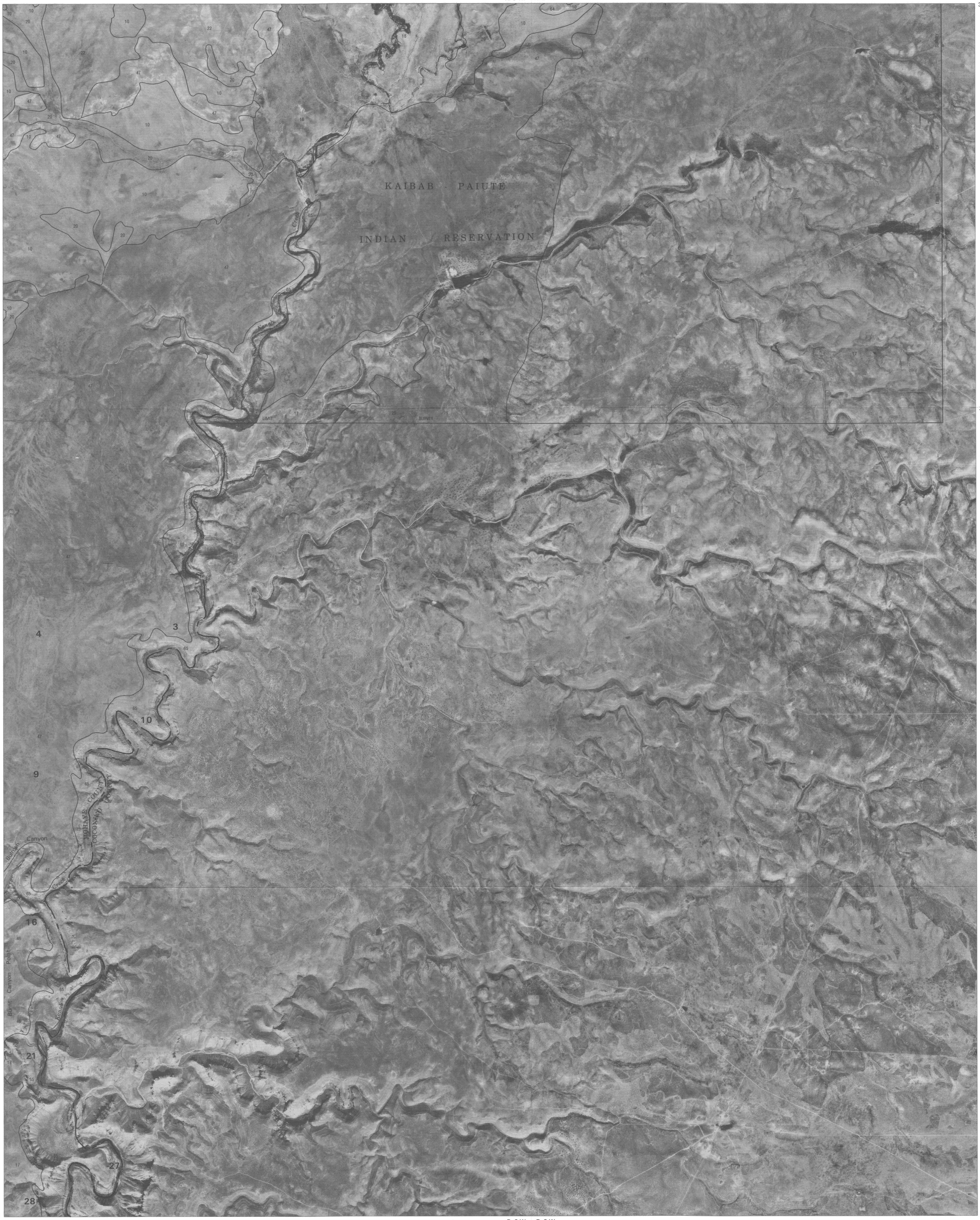
1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

PIPE SPRING, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

CLEAR WATER SPRING, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 14 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

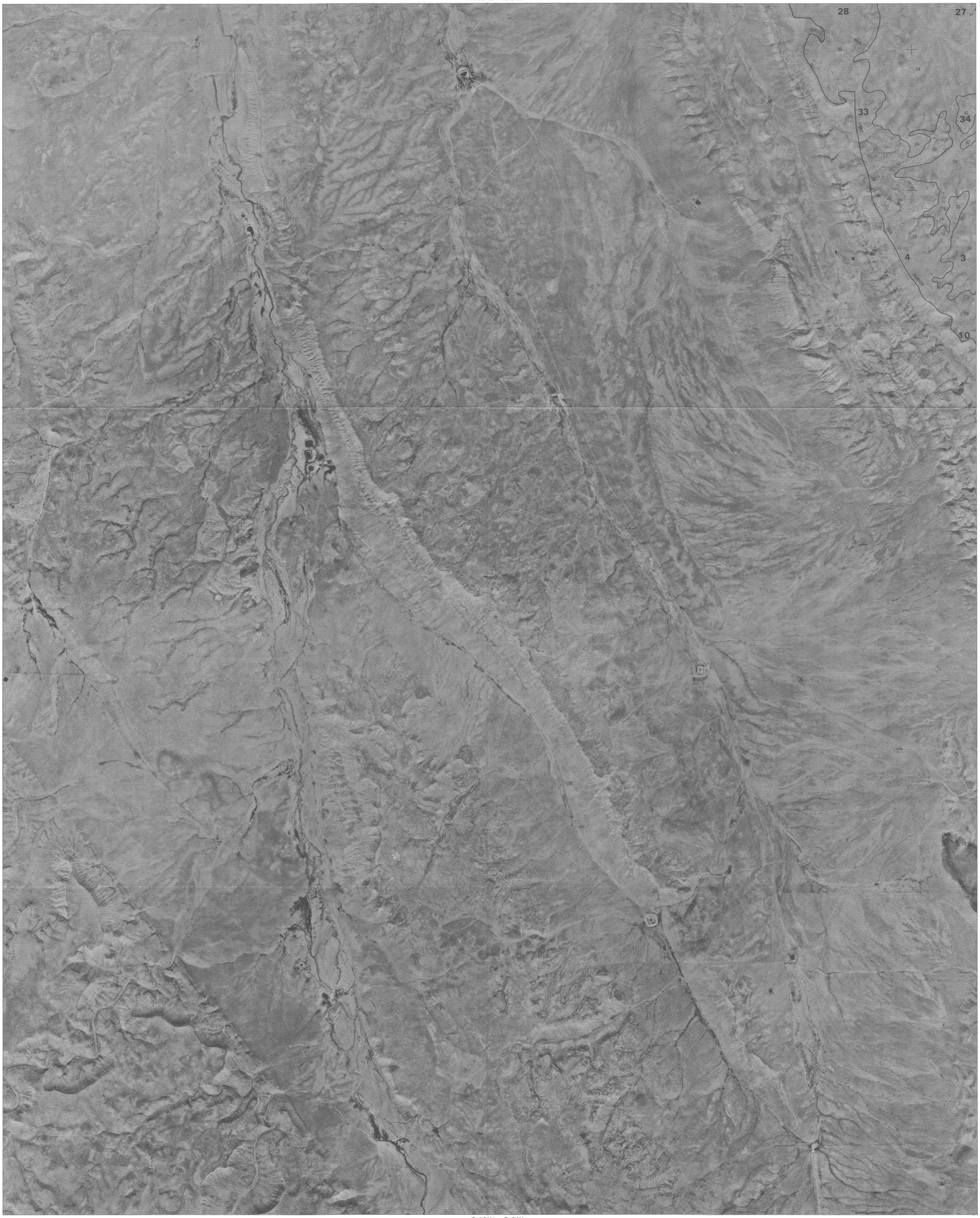
Joins sheet 8, Gyp Pocket

Joins sheet 9, White Pockets

113° 22'30" 113° 20'00" R. 10 W. R. 9 W. 113° 17'30" 113° 15'00"

36° 45'00" 36° 45'00"

T. 39 N. T. 38 N. T. 39 N. T. 38 N.



36° 42'30" 36° 42'30"

Joins sheet 16, Antelope Knoll

36° 40'00" 36° 40'00"

T. 38 N. T. 37 N. T. 38 N. T. 37 N.

36° 37'30" 36° 37'30"

113° 22'30" 113° 20'00" R. 10 W. R. 9 W. 113° 17'30" 113° 15'00"

Joins sheet 22, Russell Spring

Joins sheet 23, Moriah Knoll

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

THE GRANDSTAND, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 15 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
ANTELOPE KNOLL QUADRANGLE
SHEET NUMBER 16 OF 36

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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 12.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

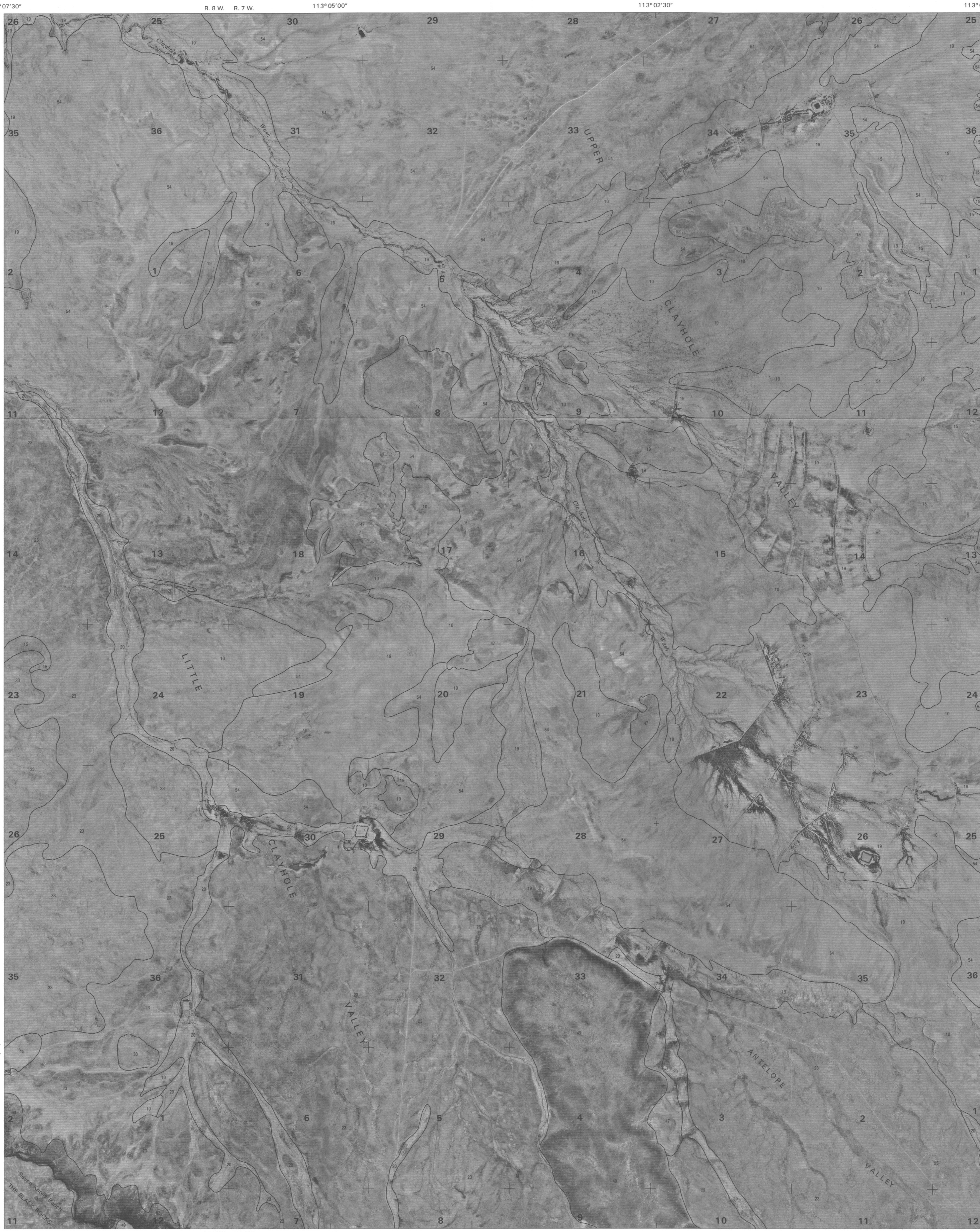
MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

ANTELOPE KNOLL, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 16 OF 36



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

LITTLE CLAYHOLE VALLEY, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 17 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

WILD BAND POCKETS, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 18 OF 36

Joins sheet 11, Maroney Well

Joins sheet 12, Pipe Valley

Joins sheet 13, Pipe Spring

Joins sheet 18, Wild Band Pockets

Joins sheet 20, Findlay Tank

Joins sheet 25, Heaton Knolls

Joins sheet 26, Robinson Canyon

Joins sheet 27, Grama Spring

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NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

SUNSHINE RIDGE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 19 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

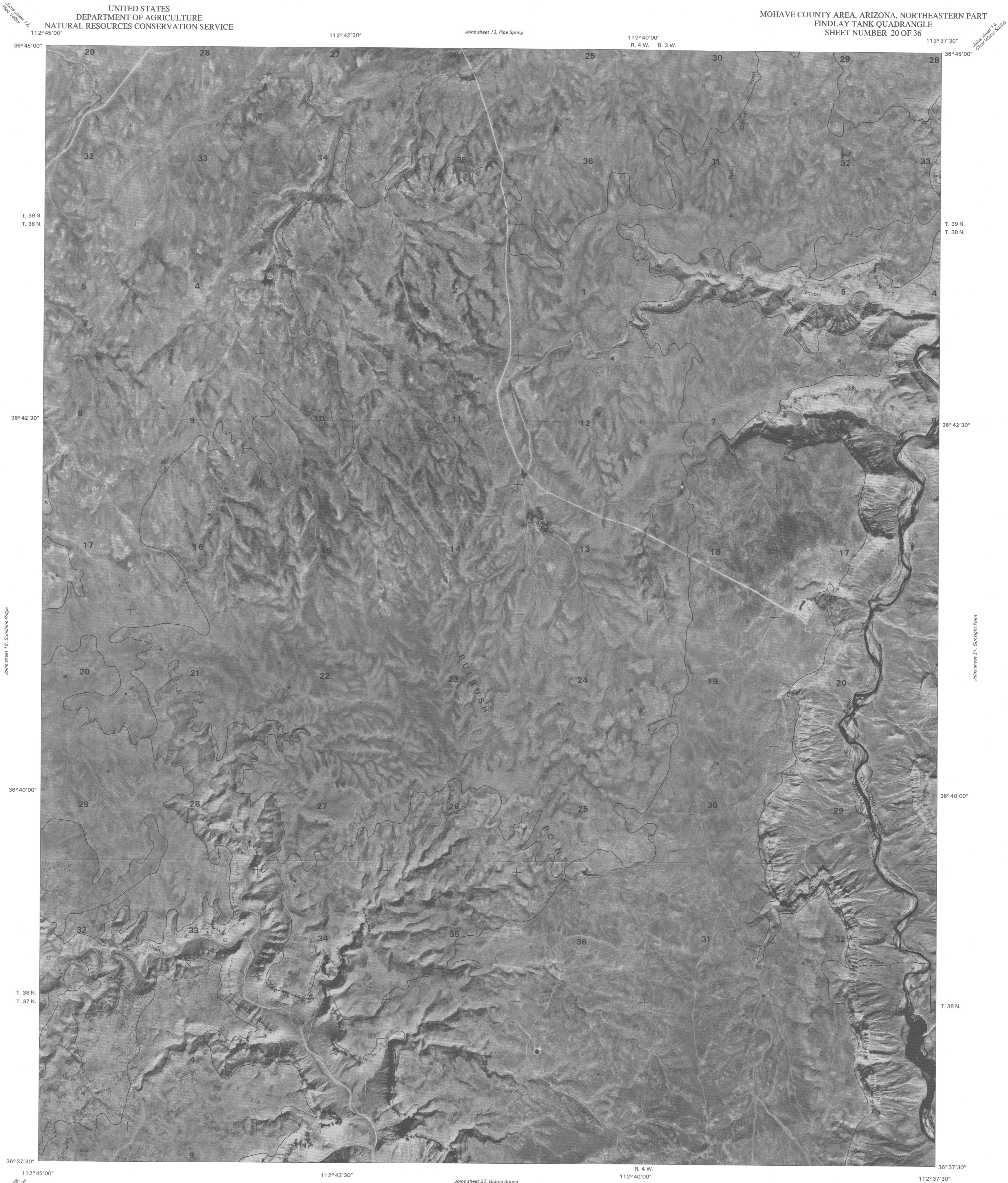
1 0 1 KILOMETERS

QUADRANGLE LOCATION

LOST SPRING MTN WEST & LITTLE CREEK MTN, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 2 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
FINDLAY TANK QUADRANGLE
SHEET NUMBER 20 OF 36



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

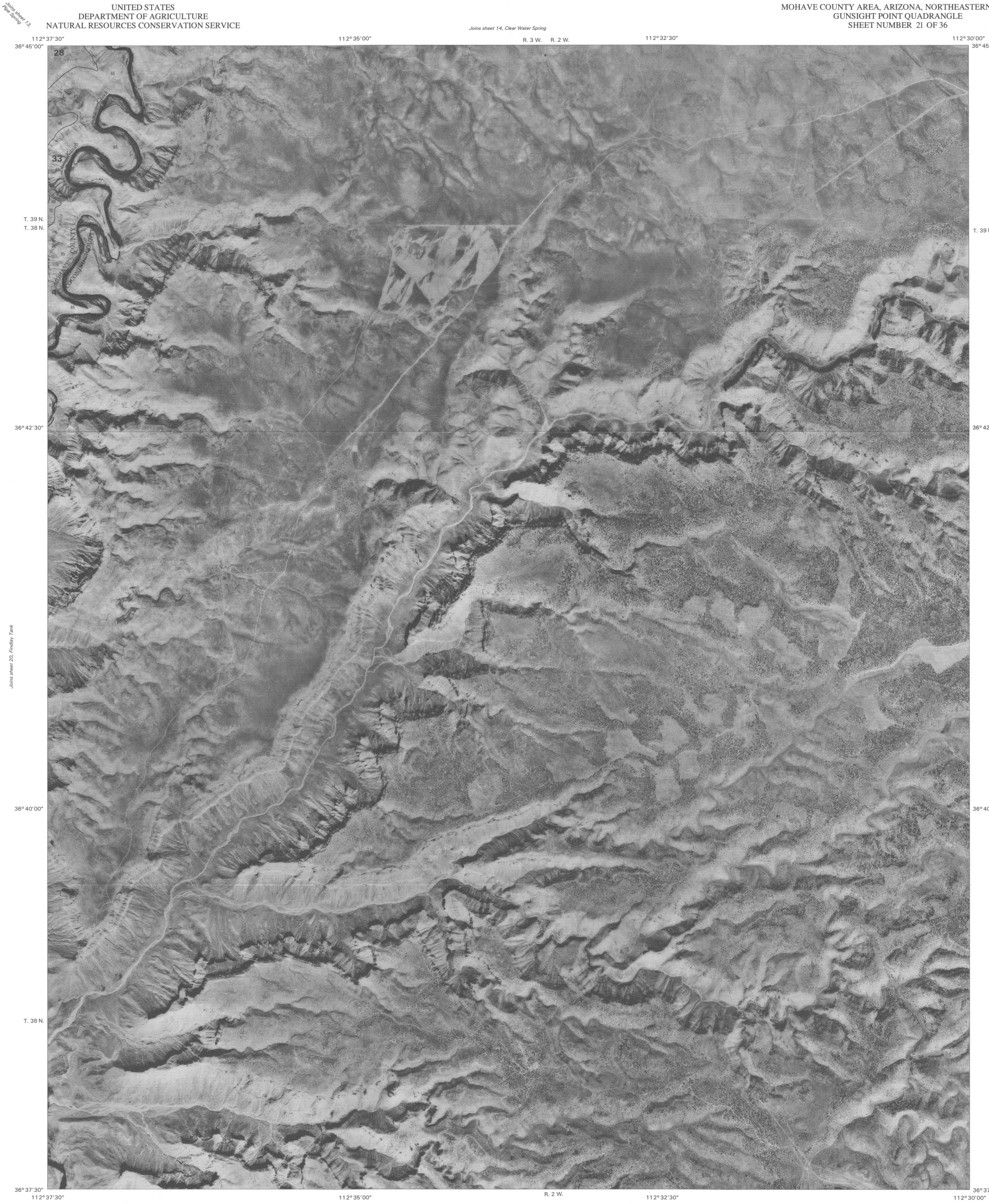
MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

FINDLAY TANK, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 20 OF 36



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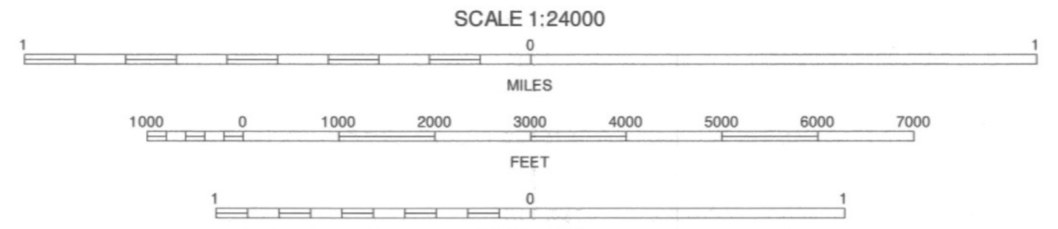
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000



QUADRANGLE LOCATION

GUNSIGHT POINT, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 21 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
RUSSELL SPRING QUADRANGLE
SHEET NUMBER 22 OF 36

Joins sheet 15, The Grandstand

Joins sheet 16, Antelope Knoll

Joins sheet 23, Moriah Knoll

Joins sheet 28, Jones Hill

Joins sheet 29, Mount Trumbull

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

RUSSELL SPRING, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 22 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 15, The Grandstand

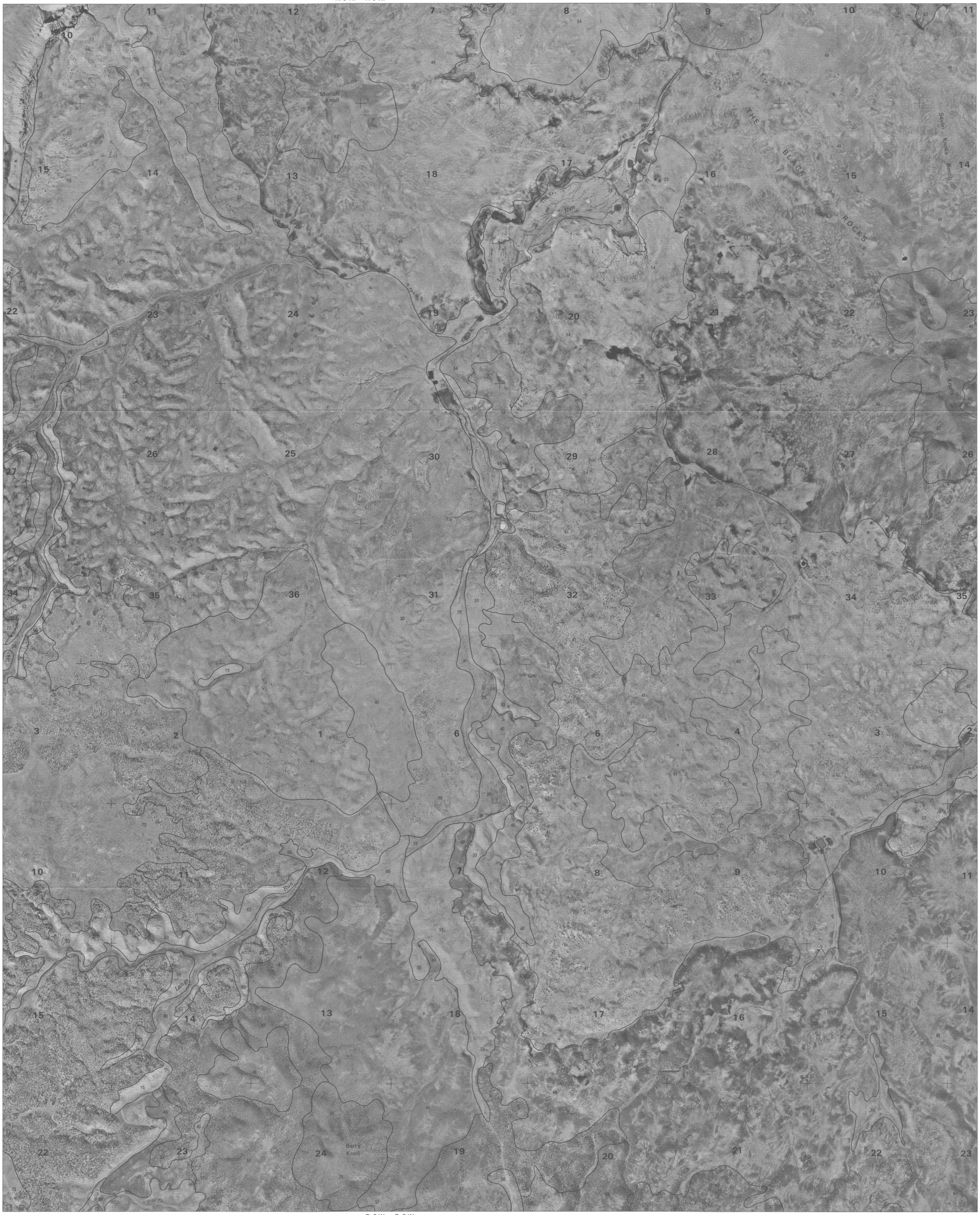
Joins sheet 16, Antelope Knoll

Joins sheet 17, Little Clayhole Valley

113°15'00" 113°12'30" 113°10'00" 113°07'30"

R. 9 W. R. 8 W.

36°37'30"



36°35'00" 36°35'00"

Joins sheet 22, Russell Spring

T. 37 N.
T. 36 N.

Joins sheet 24, Hat Knoll

36°32'30" 36°32'30"

36°30'00" 36°30'00"

113°15'00" 113°12'30" 113°10'00" 113°07'30"

R. 9 W. R. 8 W.

Joins sheet 28, Jones Hill

Joins sheet 29, Mount Trumbull

Joins sheet 30, Mount Trumbull NE

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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 12.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

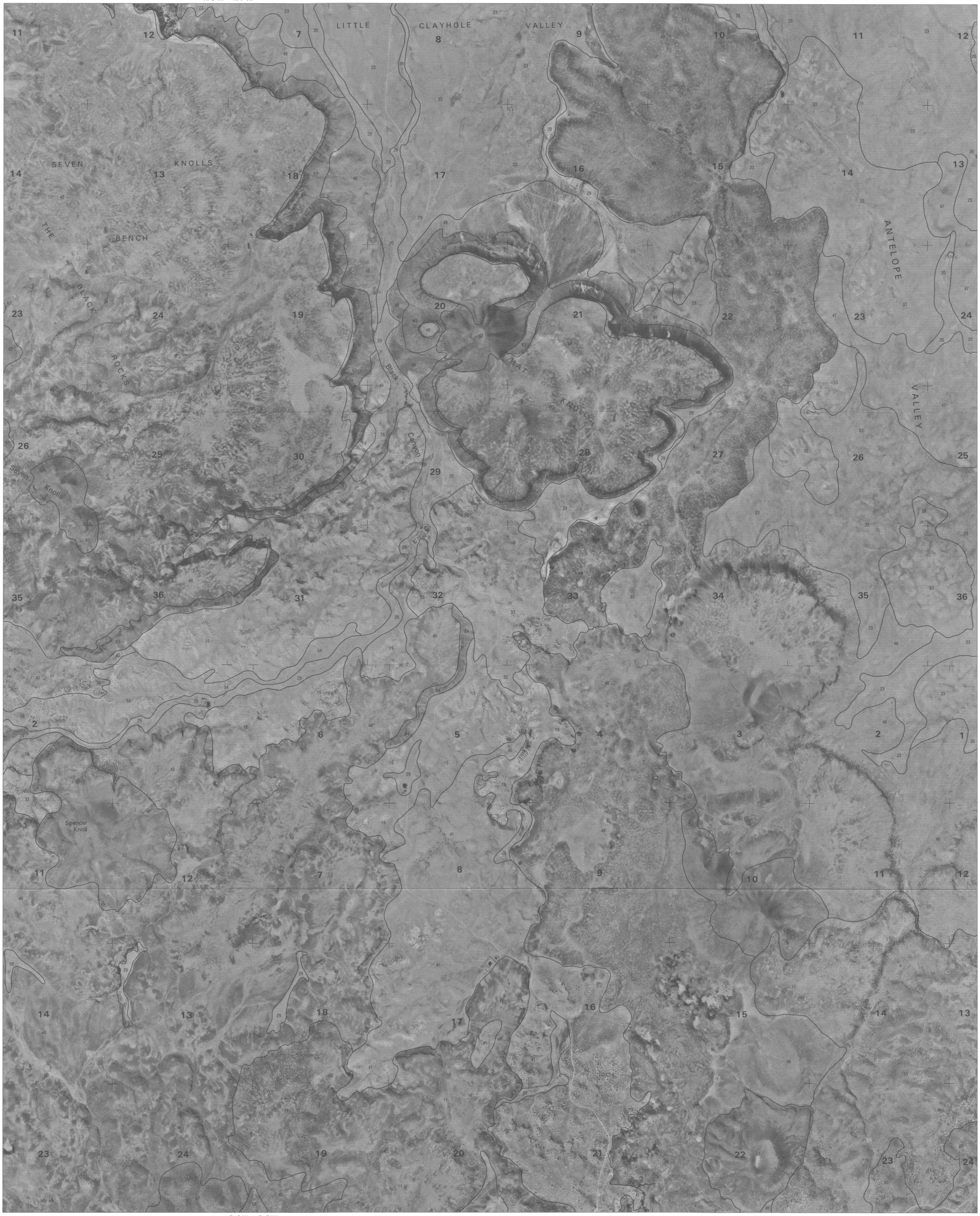
1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

MORIAH KNOLL, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 23 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

HAT KNOLL, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 24 OF 36

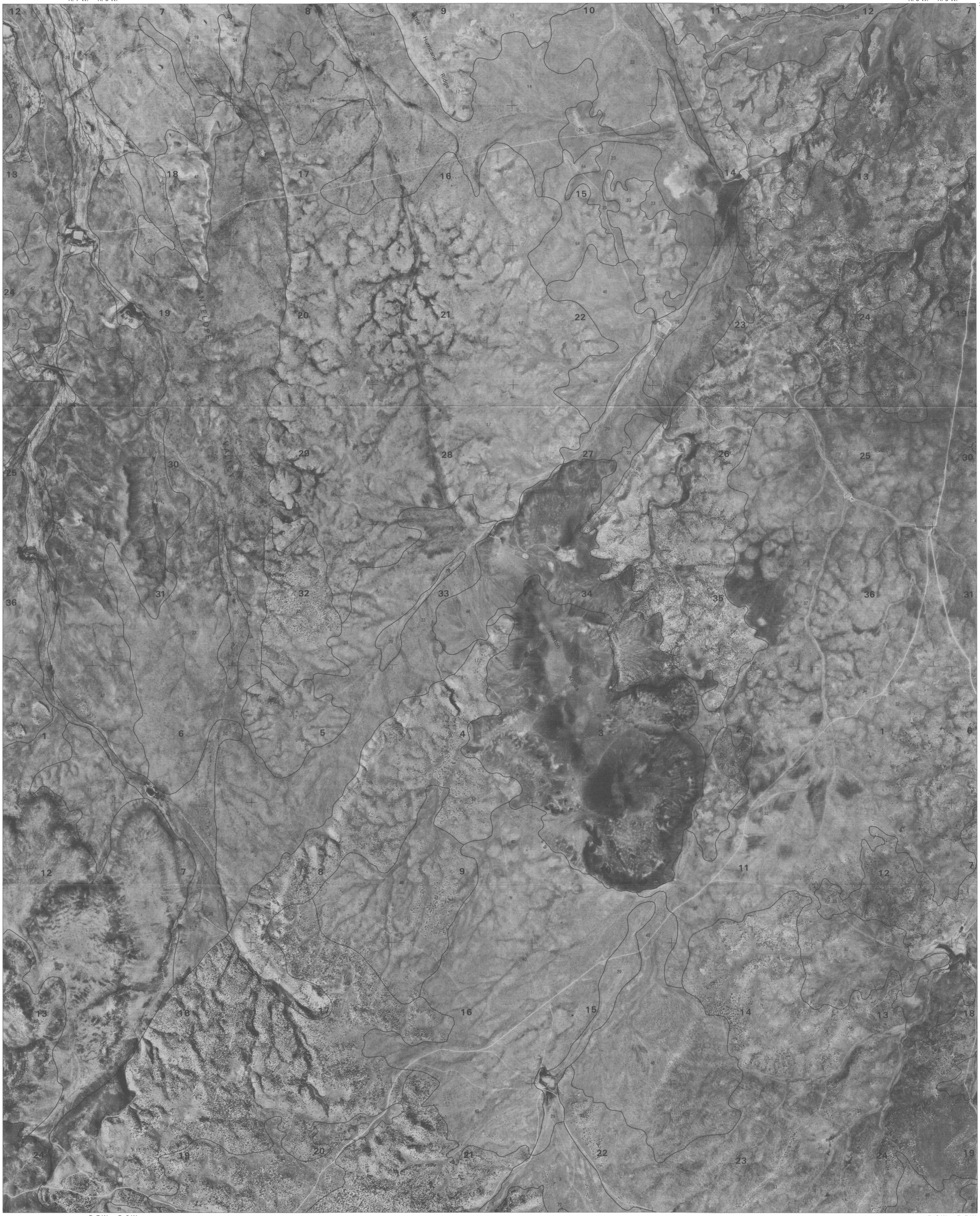
Joins sheet 17, Little Clayhole Valley

Joins sheet 18, Wild Band Pockets

Joins sheet 19, Sunshine Ridge

113°00'00" R. 7 W. R. 6 W. 112°57'30" 112°55'00" R. 6 W. R. 5 W. 112°52'30"

36°37'30" 36°37'30"



36°35'00" 36°35'00"

T. 37 N.
T. 36 N.

Joins sheet 24, Hat Knoll

Joins sheet 26, Robinson Canyon

36°32'30" 36°32'30"

36°30'00" R. 7 W. R. 6 W. R. 6 W. R. 5 W. 36°30'00"

113°00'00" 112°57'30" 112°55'00" 112°52'30"

Joins sheet 31, Hancock Knolls

Joins sheet 30, Mount Trumbull NE

Joins sheet 32, Hilltop Tank

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

HEATON KNOLLS, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 25 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
ROBINSON CANYON QUADRANGLE
SHEET NUMBER 26 OF 36

Joins sheet 18, Wild Band Pockets

Joins sheet 19, Sunshine Ridge

Joins sheet 20, Findley Tank

Joins sheet 31, Hancock Knolls

Joins sheet 32, Hitson Tank

Joins sheet 33, Kanab Point

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

ROBINSON CANYON, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 26 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 15, Sunshine Ridge
Joins sheet 20, Findlay Tank
Joins sheet 21, Gunsight Point
Joins sheet 26, Robinson Canyon
Joins sheet 32, Hitson Tank
Joins sheet 33, Kanab Point

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NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

GRAMA SPRING, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 27 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
JONES HILL QUADRANGLE
SHEET NUMBER 28 OF 36

Joins sheet 22, Russell Spring

Joins sheet 23, Moriah Knoll

Joins sheet 29, Mount Trumbull

Joins sheet 34, Cold Spring

Joins sheet 35, Mount Logan

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

JONES HILL, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 28 OF 36

Joins sheet 22, Russell Spring

Joins sheet 23, Moriah Knoll

Joins sheet 24, Hat Knoll

113°15'00" 113°12'30" R. 9 W. R. 8 W. 113°10'00" 113°07'30"

36°30'00" 36°30'00"

T. 36 N. / T. 35 N.

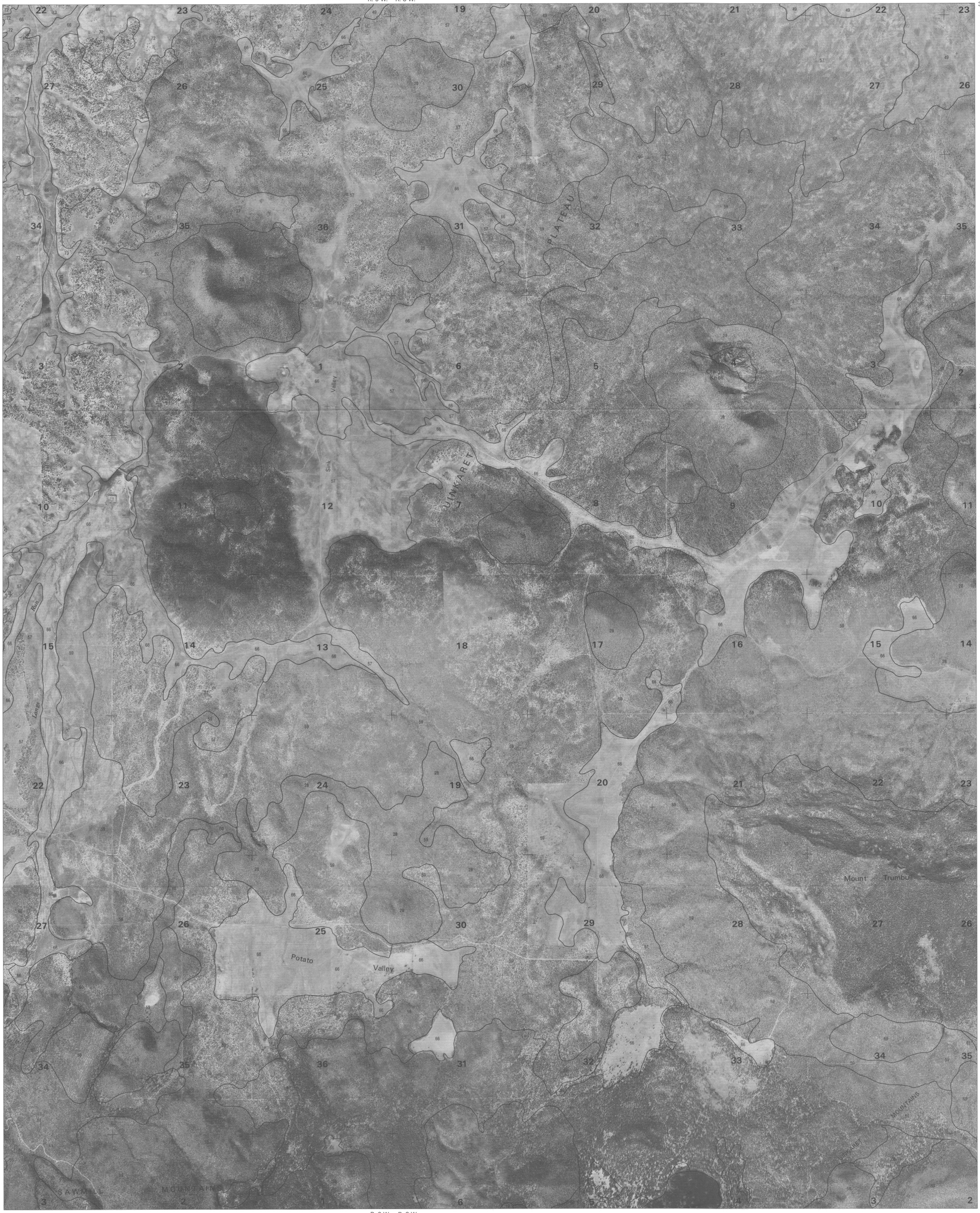
36°27'30" 36°27'30"

Joins sheet 28, Jones Hill

Joins sheet 30, Mount Trumbull NE

36°25'00" 36°25'00"

T. 35 N. / T. 34 N.



36°22'30" 36°22'30"

113°15'00" 113°12'30" R. 9 W. R. 8 W. 113°10'00" 113°07'30"

Joins sheet 34, Cold Spring

Joins sheet 35, Mount Logan

Joins sheet 36, Mount Trumbull SE

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

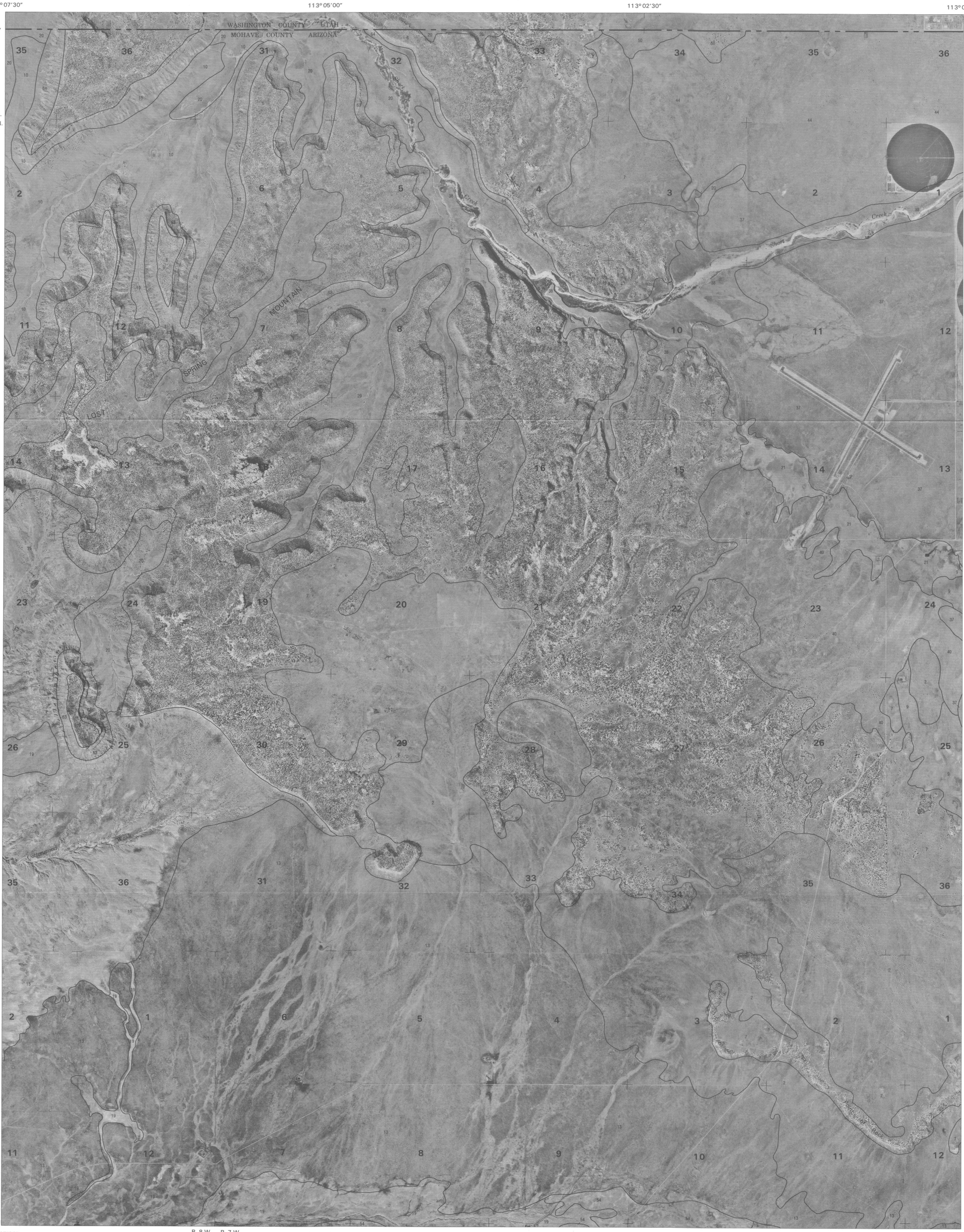
1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

MOUNT TRUMBULL, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 29 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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NORTH

SCALE 1:24000

MILES

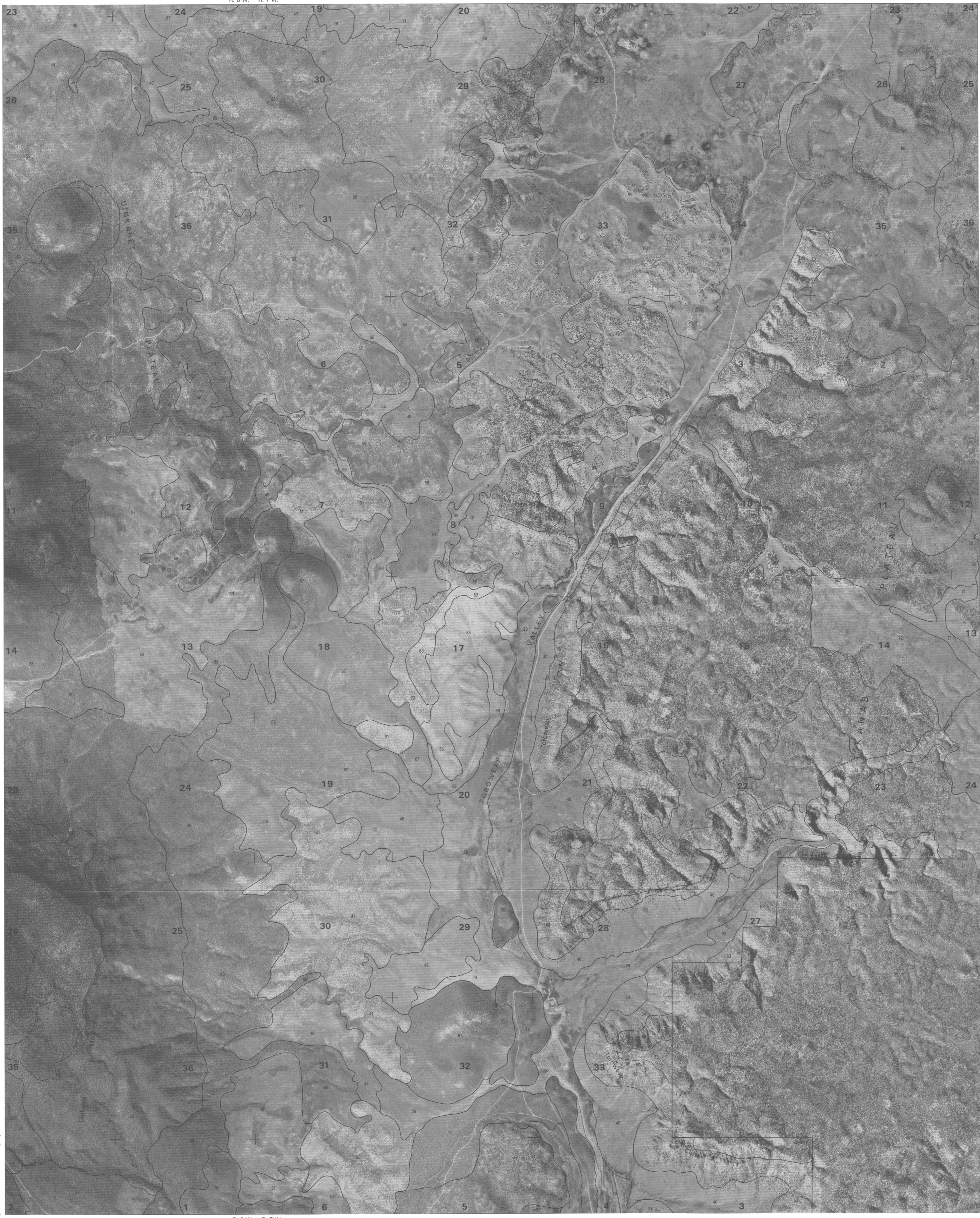
FEET

KILOMETERS

QUADRANGLE LOCATION

LOST SPRING MTN EAST & SMITHSONIAN BUTTE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

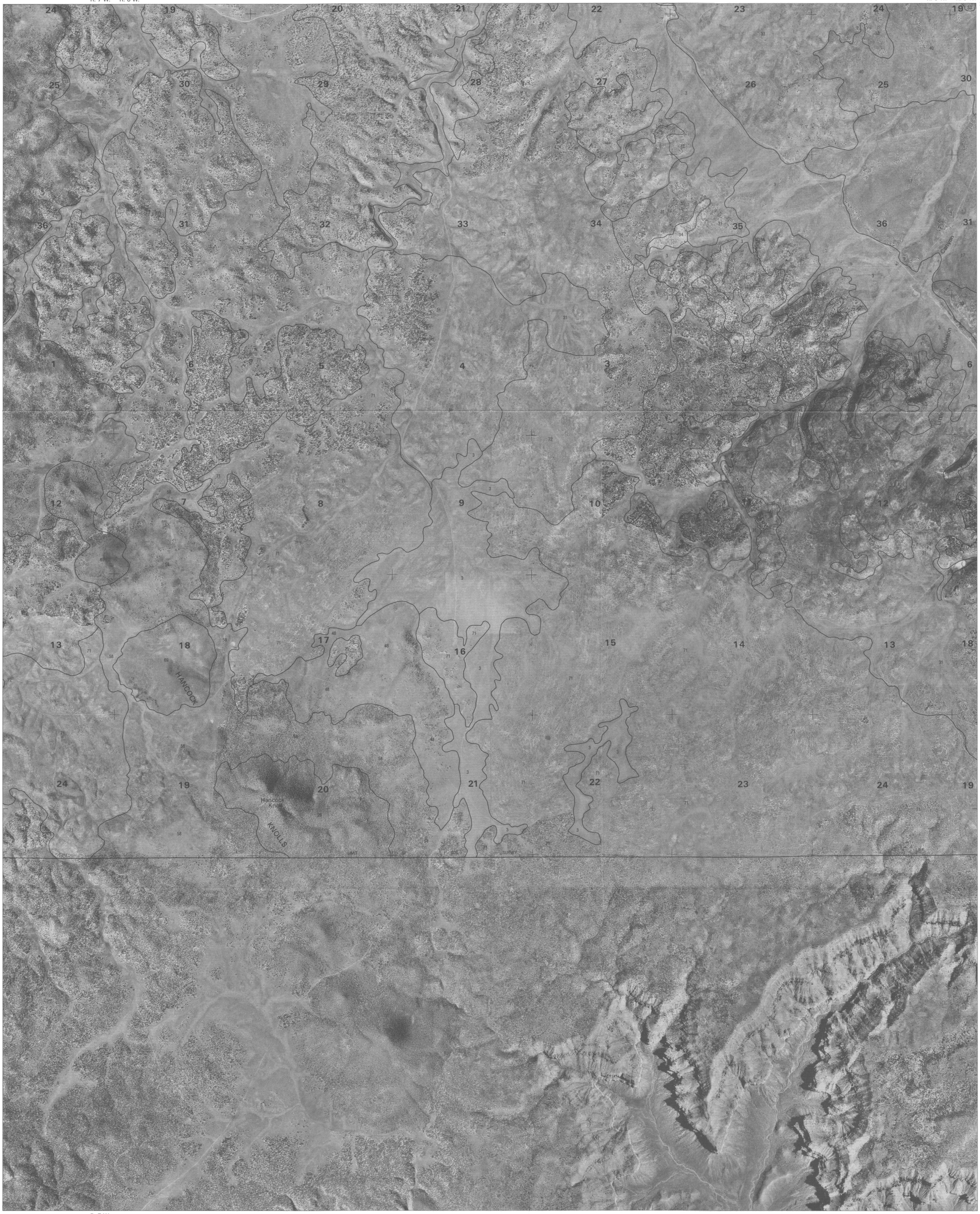
KILOMETERS

QUADRANGLE LOCATION

MOUNT TRUMBULL NE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 30 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
HANCOCK KNOLLS QUADRANGLE
SHEET NUMBER 31 OF 36



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

HANCOCK KNOLLS, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 31 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
HITSON TANK QUADRANGLE
SHEET NUMBER 32 OF 36

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

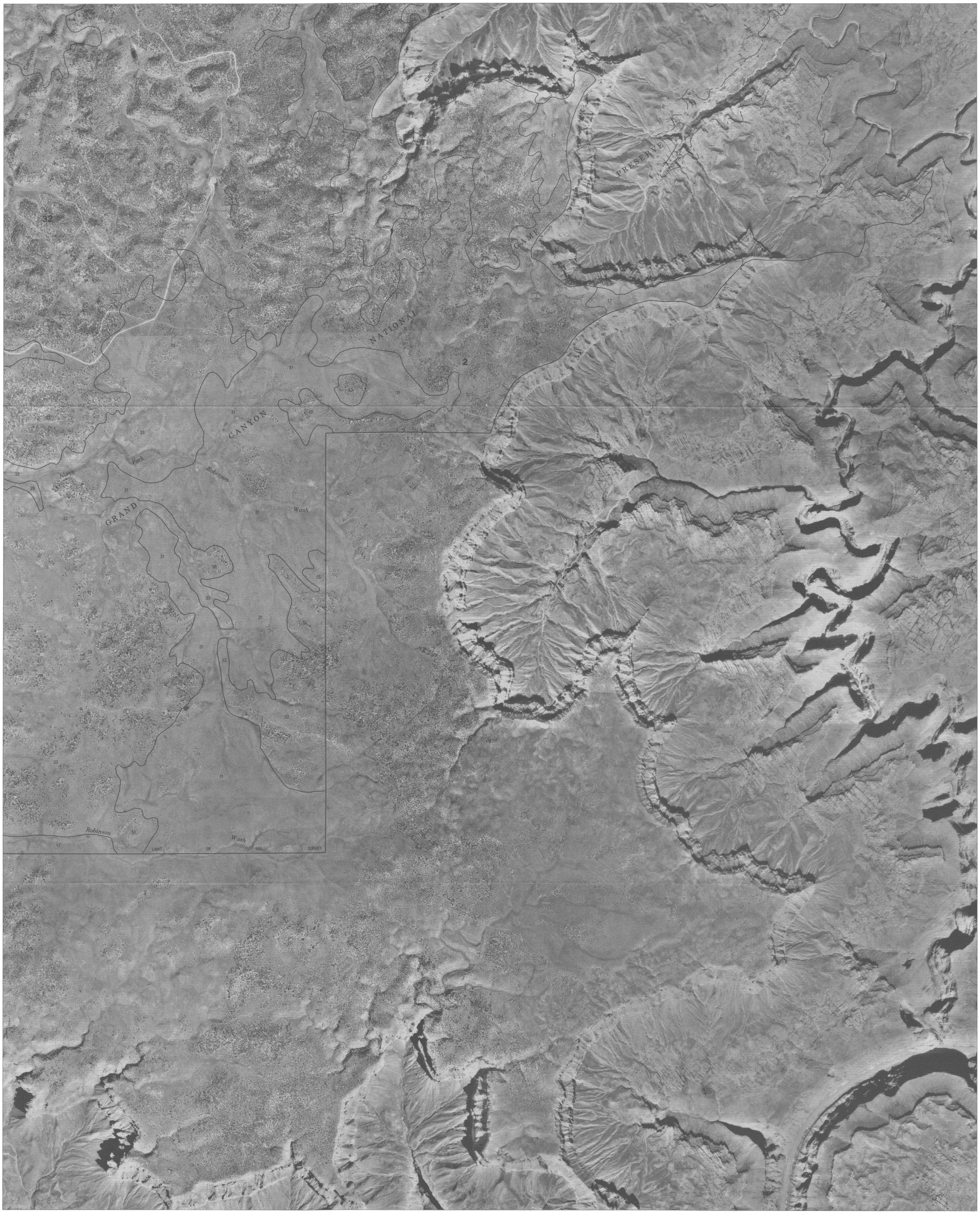
QUADRANGLE LOCATION

HITSON TANK, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 32 OF 36

Joins sheet 26, Robinson Canyon

Joins sheet 27, Grama Spring

Joins sheet 32, Hitson Tank



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

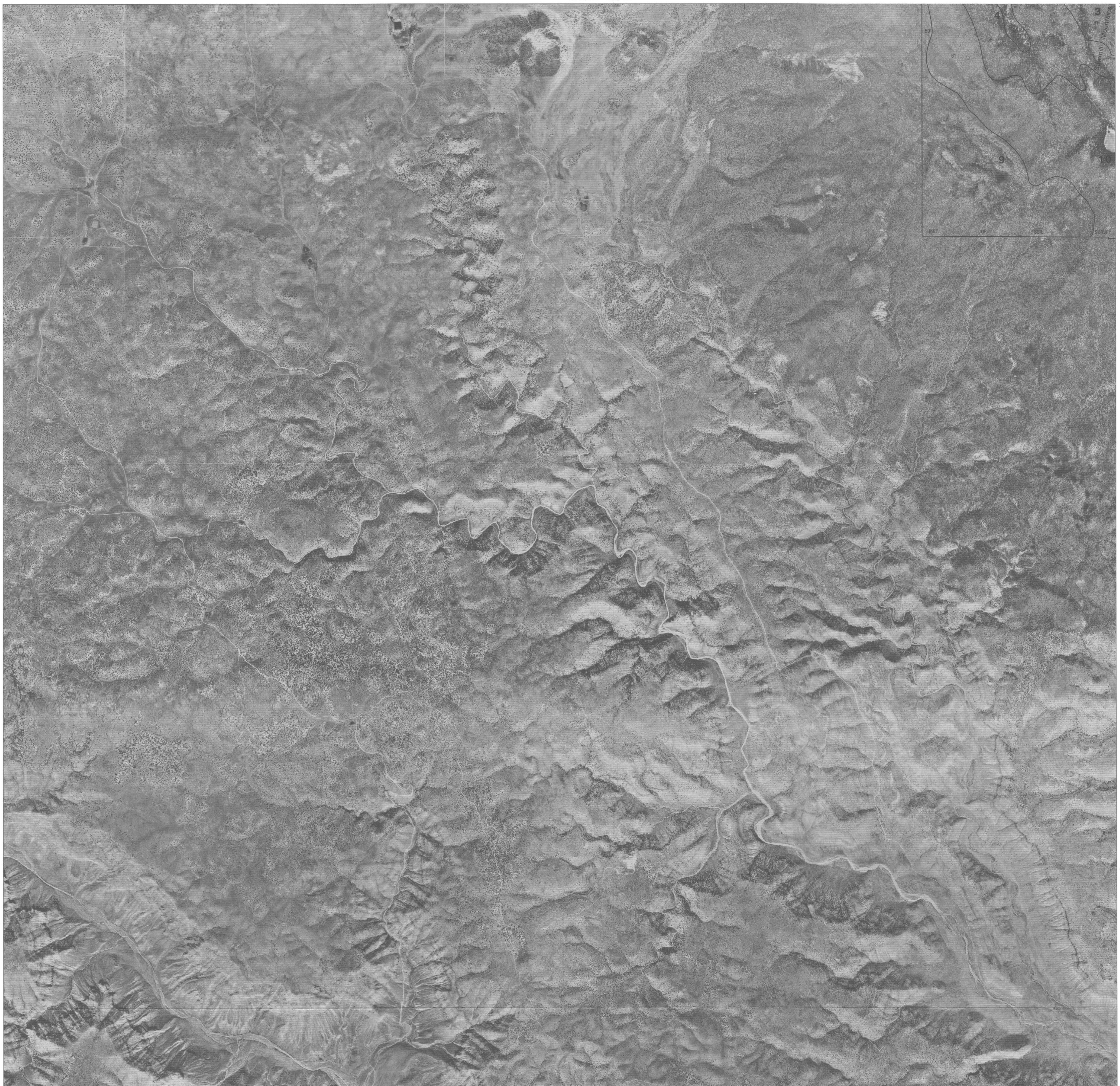
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 28, Jones Hill

Joins sheet 29, Mount Trumbull

113°22'30" R. 10 W. R. 9 W. 113°20'00" 113°17'30" 113°15'00"

36°22'30" 36°22'30"



36°20'00" 36°20'00"

Joins sheet 35, Mount Logan

T. 34 N.
T. 33 N.

36°17'30" 36°17'30"

36°15'00" 36°15'00"

113°22'30" 113°20'00" R. 10 W. R. 9 W. 113°17'30" 113°15'00"

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

COLD SPRING, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 34 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
MOUNT LOGAN QUADRANGLE
SHEET NUMBER 35 OF 36

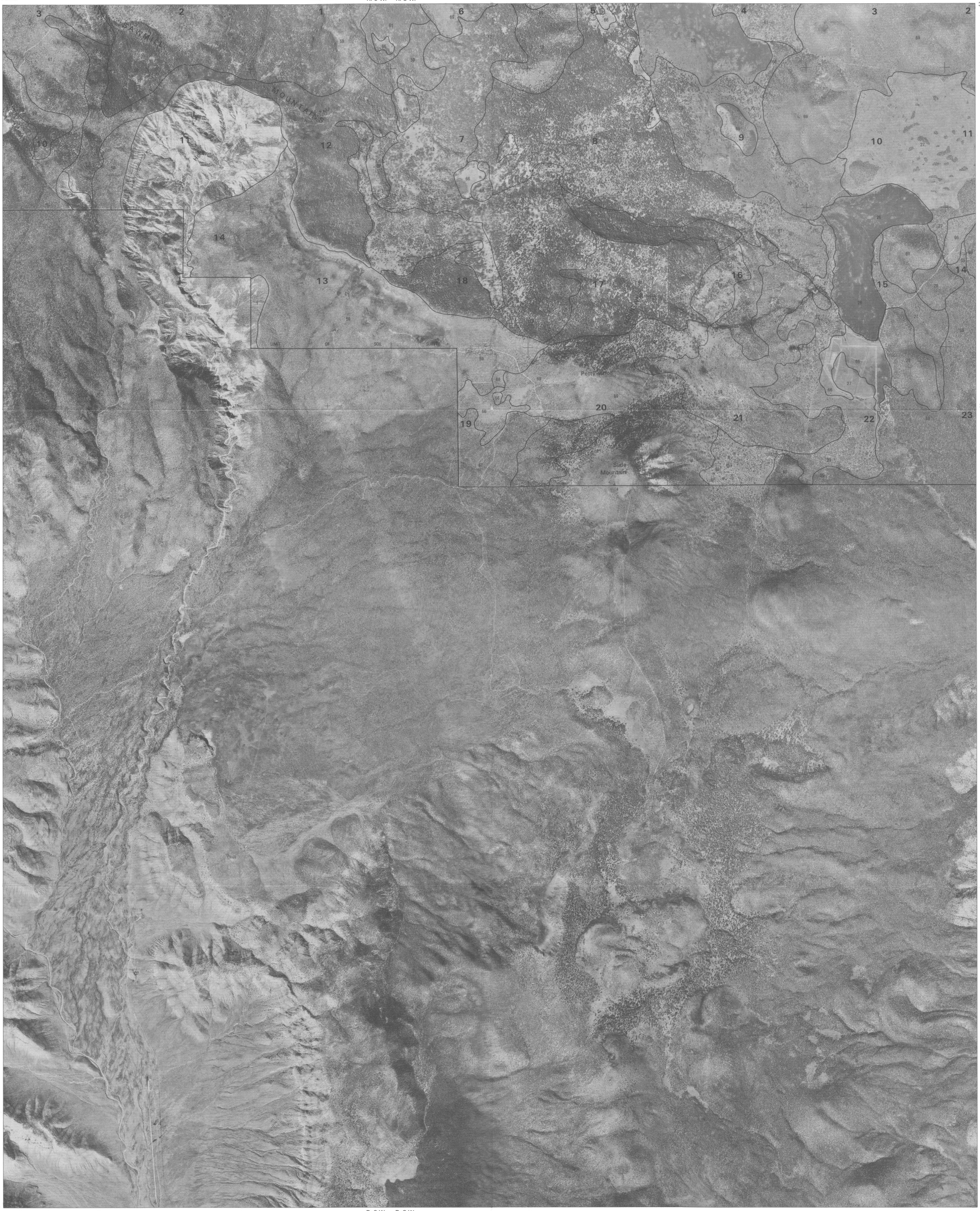
Joins sheet 28, Jones Hill

Joins sheet 29, Mount Trumbull

Joins sheet 30, Mount Trumbull NE

113°15'00" 113°12'30" R. 9 W. R. 8 W. 113°10'00" 113°07'30"

36°22'30" 36°22'30"



36°20'00" 36°20'00"

Joins sheet 34, Cold Spring

Joins sheet 36, Mount Trumbull SE

T. 34 N.
T. 33 N.

36°17'30" 36°17'30"

36°15'00" 36°15'00"

113°15'00" 113°12'30" R. 9 W. R. 8 W. 113°10'00" 113°07'30"

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

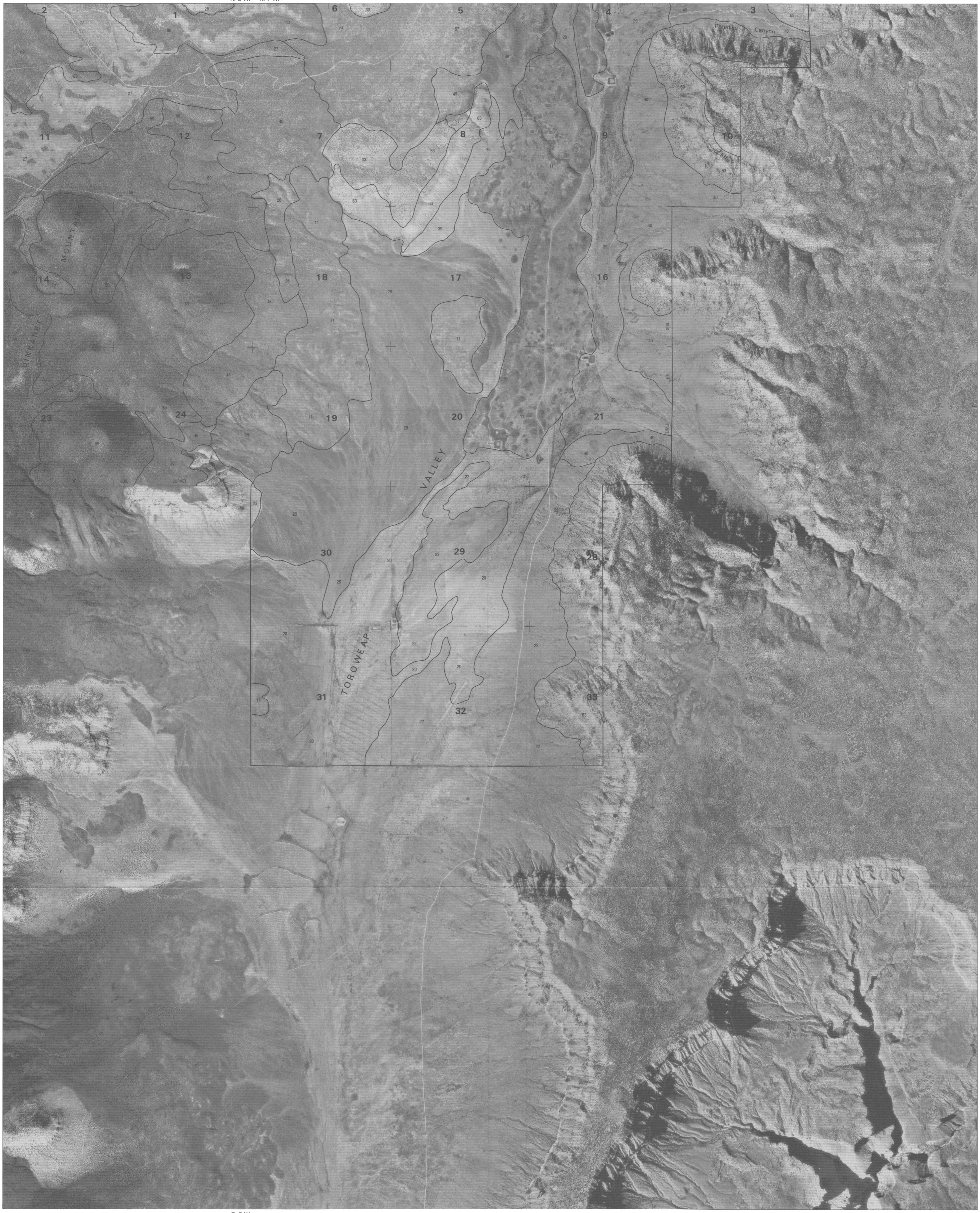
MOUNT LOGAN, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 35 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
MOUNT TRUMBULL SE QUADRANGLE
SHEET NUMBER 36 OF 36

Joins sheet 29, Mount Trumbull
Joins sheet 30, Mount Trumbull NE
Joins sheet 31, Hancock Knolls
Joins sheet 35, Mount Logan

113° 07'30" R. 8 W. R. 7 W. 113° 05'00" 113° 02'30" 113° 00'00"
36° 22'30" 36° 22'30"



36° 20'00" 36° 20'00"
T. 34 N. T. 33 N. T. 34 N.
36° 17'30" 36° 17'30"
36° 15'00" 36° 15'00"
113° 07'30" R. 8 W. 113° 05'00" 113° 02'30" 113° 00'00"

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

MOUNT TRUMBULL SE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 36 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

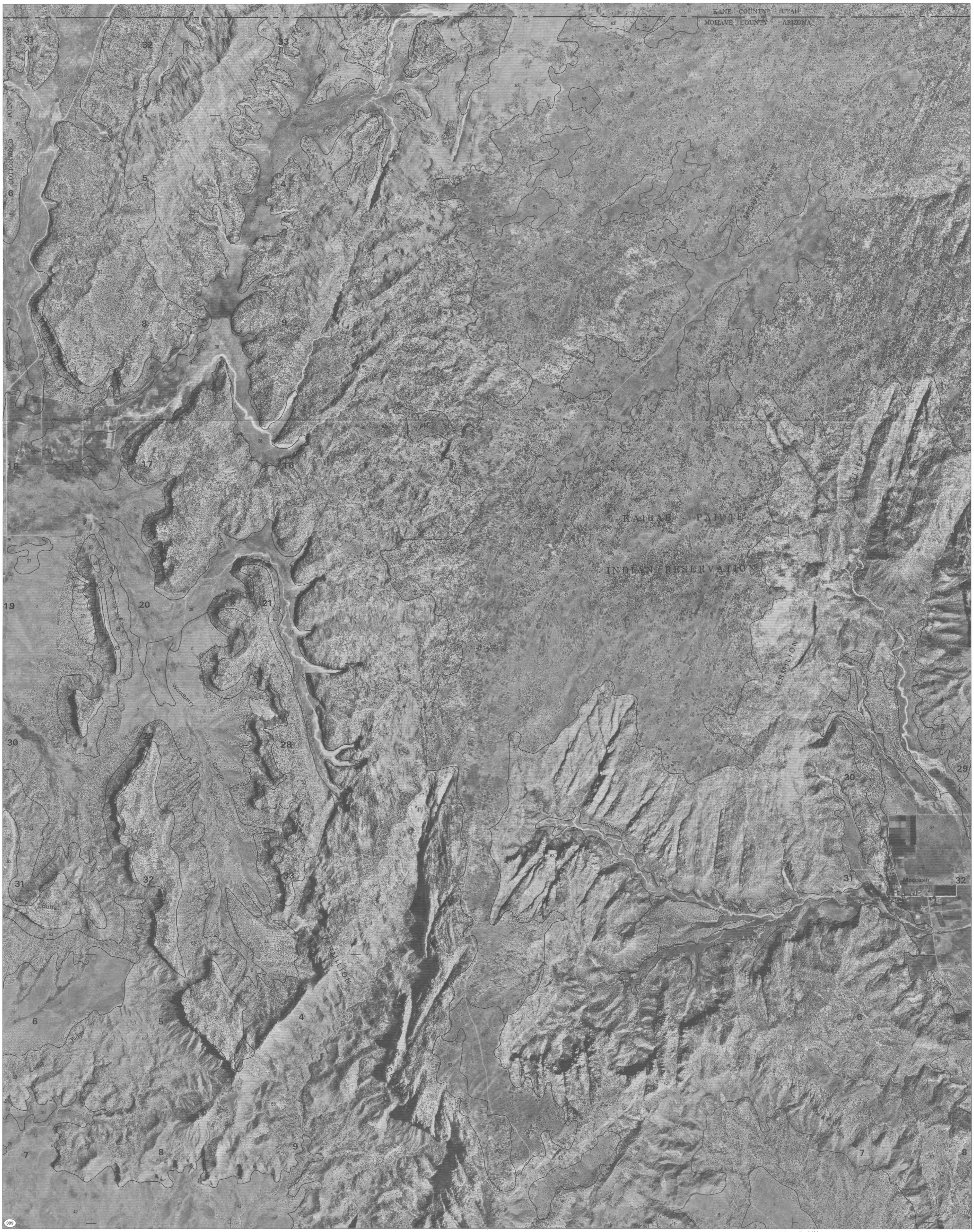
QUADRANGLE LOCATION

COLORADO CITY & HILDALE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 4 OF 36

112°52'30" 112°50'00" 112°47'30" 112°45'00"

37°00'00" 37°00'00"

T. 42 N.
T. 41 N.



36°57'30" 36°57'30"

Joins sheet 4, Colorado City

Joins sheet 6, Kaibab

36°55'00" 36°55'00"

T. 41 N.
T. 40 N.

T. 41 N.
T. 40 N.

36°52'30" 36°52'30"

112°52'30" 112°50'00" 112°47'30" R. 5 W. R. 4 W. 112°45'00"

Joins sheet 11, Maroney Well

Joins sheet 12, Pipe Valley

Joins sheet 13, Pipe Spring

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NORTH

SCALE 1:24000

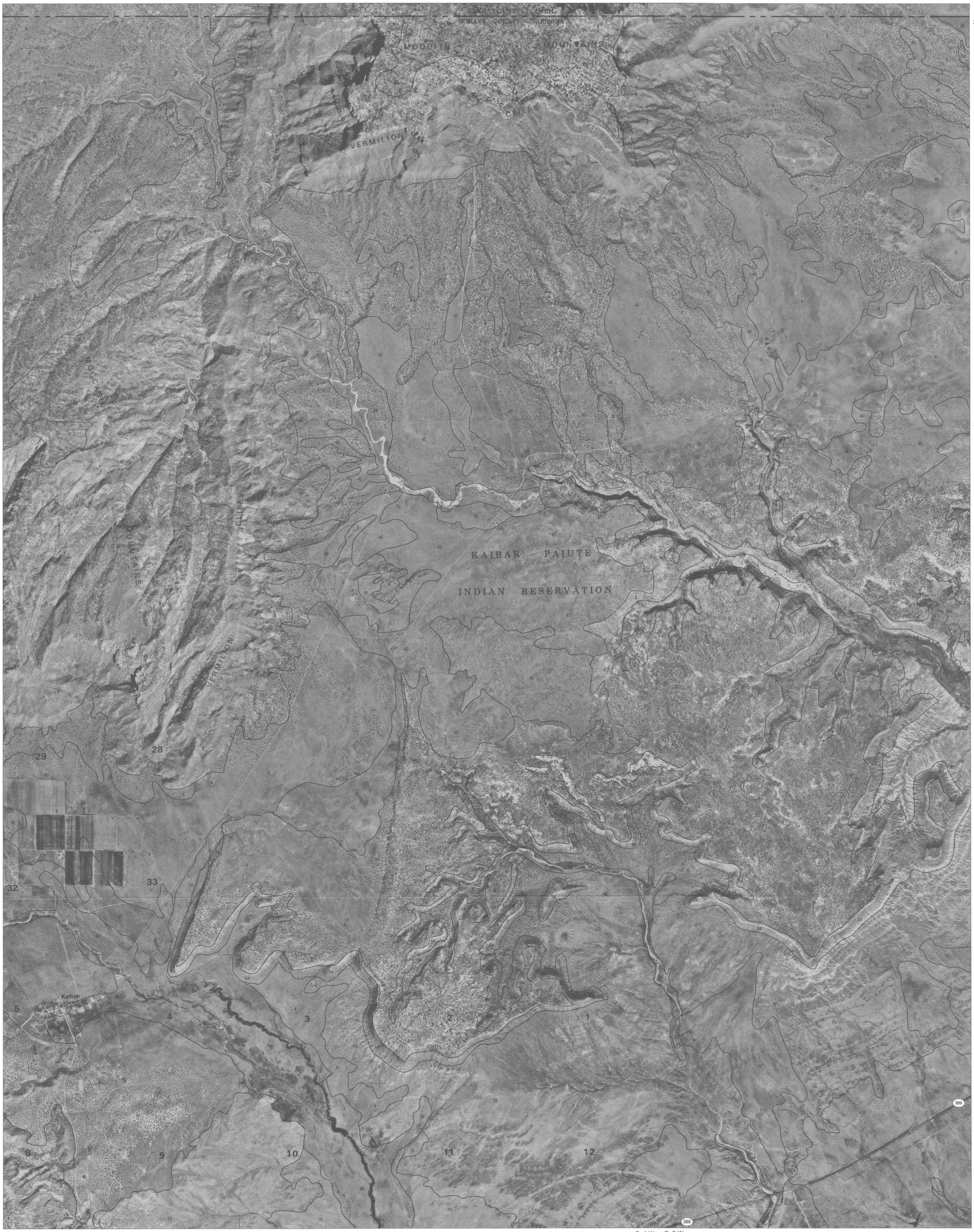
1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

MOCCASIN & ELEPHANT BUTTE, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 5 OF 36



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

KAIBAB & YELLOWJACKET CANYON, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 6 OF 36

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

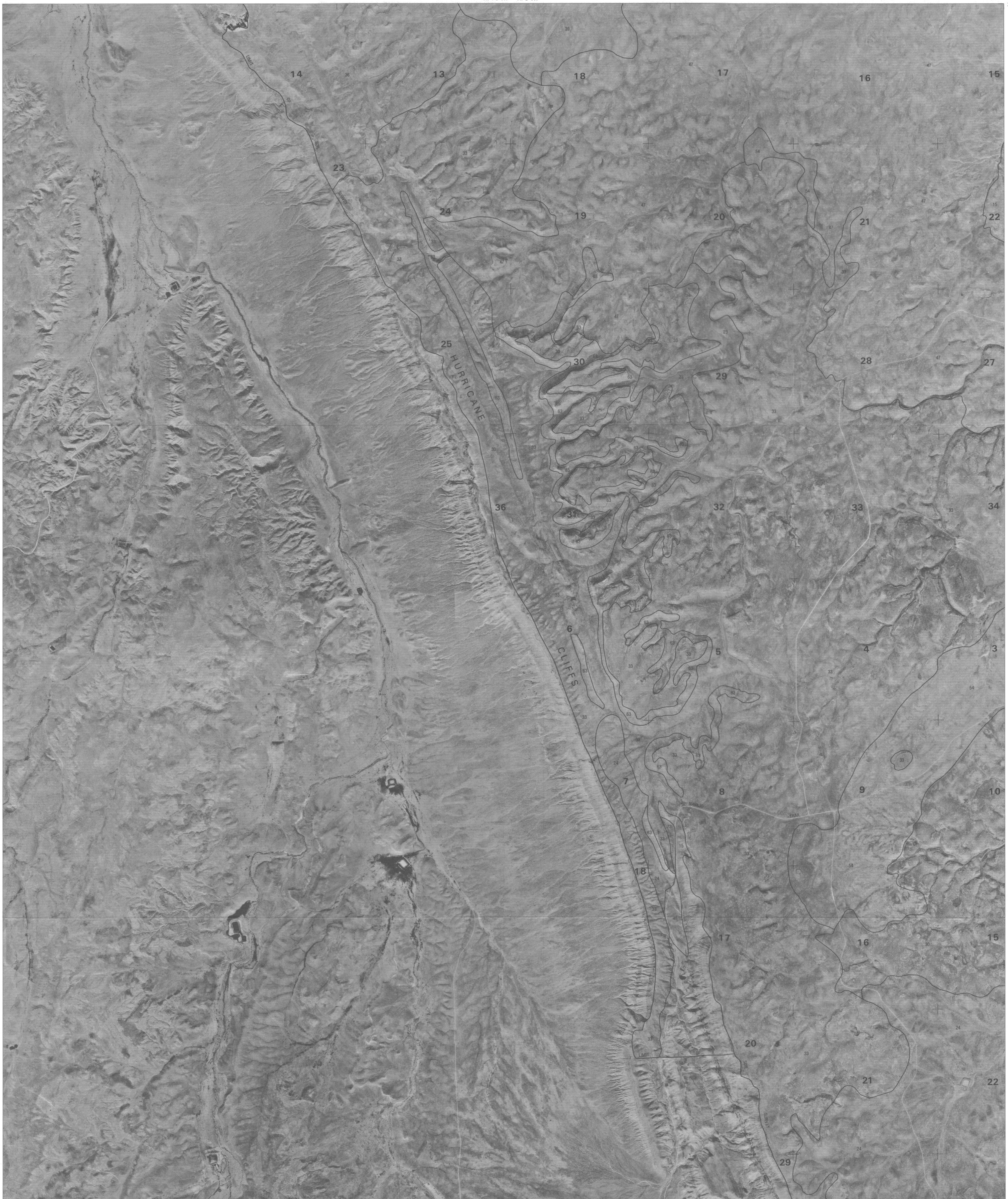
1 0 1
KILOMETERS

QUADRANGLE LOCATION

FREDONIA & KANAB, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 7 OF 36

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MOHAVE COUNTY AREA, ARIZONA, NORTHEASTERN PART
GYP POCKET QUADRANGLE
SHEET NUMBER 8 OF 36



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

GYP POCKET, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 8 OF 36

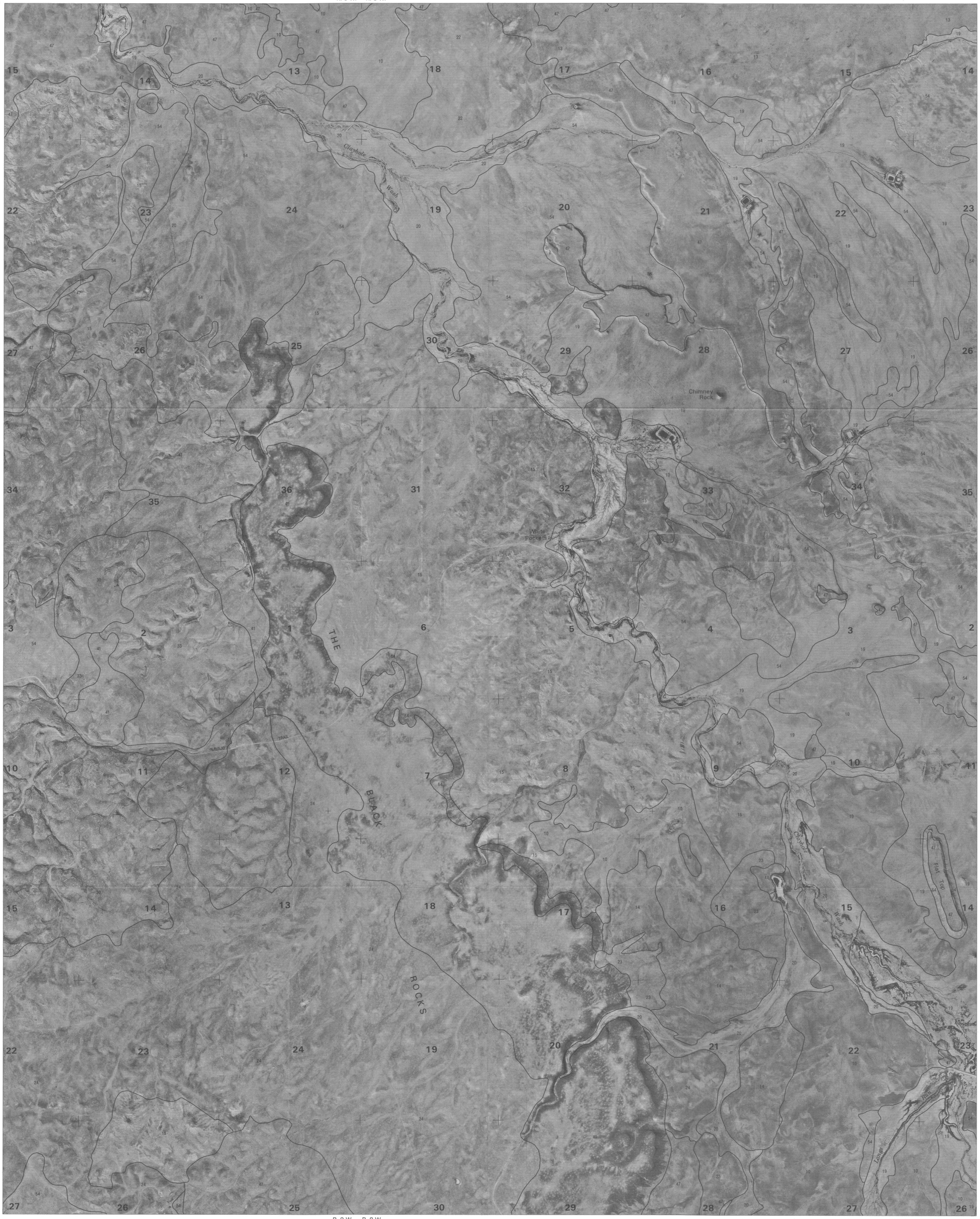
Joins sheet 1, Rock Canyon

Joins sheet 3, Lost Spring Mountain East

Joins sheet 2, Lost Spring Mountain West

113°15'00" 113°12'30" R. 9 W. R. 8 W. 113°10'00" 113°07'30"

36°52'30"



36°50'00"

T. 40 N.
T. 39 N.

Joins sheet 8, Gyp Pocket

Joins sheet 10, Formaster Well

36°47'30"

36°45'00"

113°15'00" 113°12'30" R. 9 W. R. 8 W. 113°10'00" 113°07'30"

Joins sheet 16, Antelope Knoll

Joins sheet 15, The Grandstand

Joins sheet 17, Little Clayhole Valley

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 12. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

WHITE POCKETS, ARIZONA
7.5 MINUTE SERIES
SHEET NUMBER 9 OF 36